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HNF-20611
Revision 0

Unabated Emissions Estimate for the PUREX 291-A-1 Stack

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Fluor Hanford
P.O. Box 1000
Richland, Washington

Contractor for the U.S. Department of Energy
Richland Operations Office under Contract DE-AC06-96RL13200

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DL Johnson, Fluor Hanford

July, 2004

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This document provides a description of the method used to measure concentrations of airborne radionuclides upstream of the PUREX HEPA filtration system, and to estimate the potential unabated emissions for the 291-A-1 stack during normal, deactivated facility operations. The potential, unabated offsite dose is estimated to be 0.031 mrem/yr.

The 291-A-1 stack is the current discharge point for the PUREX Plant ventilation system. The building underwent terminal clean out in the late 90's to minimize emissions potential, which included isolation of Deep Bed Fiberglass Filter #1 from the ventilation flow path, consolidation of the ventilation system from multiple stacks to a single stack, and reduction of exhaust fan operation and stack flow (from 120,000 cfm down to only 30,000 cfm). Once PUREX deactivation was complete in 1997, the building was placed in a minimal surveillance and maintenance mode. The 291-A-1 stack has remained provisionally designated as a major stack until reduced operations could demonstrate otherwise. Low emissions have made it a candidate for a more accurate and definitive assessment. The high cost of regulatory compliance for major stacks justifies the cost of an assessment that could lead to downgrade of the stack designation, thereby eliminating these requirements. This document details the method used to assess the 291-A-1 stack.

Approvals

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PUREX FEMP	BHI-01246, Rev 0	Environmental	Dan Johnson	7-22-04
Radionuclide NESHAPs PTE Assessment Doc.	HNF-1974, Rev 1	Environmental	Larry Diediker	7-22-04

Unabated Emissions Estimate for the PUREX 291-A-1 Stack

PURPOSE

DOE Facilities are required to comply with EPA regulation (40 CFR 61, Subpart H) and DOH regulation (WAC 246-247). Continuous emission monitoring and test procedures are required for any release point which has a potential to emit radionuclides into the air in quantities which could cause a dose in excess of 0.1 mrem/yr to the maximally exposed public individual (i.e., major sources). Since the applicability of several regulatory requirements depends on the designation of the emission unit, it is beneficial to accurately assess the emission unit. This document is intended to provide a conservative, yet accurate assessment of the PUREX 291-A-1 stack.

SUMMARY

Stack release potential is estimated based on the EPA 40 CFR 61.93(b)(4)(ii) assumption that all pollution control equipment does not exist, but the emission unit operations are otherwise normal. The concentrations of airborne radionuclides were sampled upstream of the PUREX Plant HEPA filtration system, during normal operations. Based on laboratory analysis of the samples and subsequent dispersion modeling using the EPA approved model, the potential, unabated offsite dose is conservatively estimated to be **0.031 mrem/yr**, which supports designation of the 291-A-1 stack as a minor source.

QUALITY ASSURANCE

The activities described in this document meet the quality assurance (QA) requirements for radioactive air sampling and for calculating the highest hypothetical dose to a member of the public from potential emissions from the 291-A-1 stack. Radioactive air emissions sampling and data handling was conducted in accordance with applicable federal and state QA requirements. The quality of the sampling method was assured through ANSI N13.1-1999 Committee member consultation, which confirmed the alternative sampling method including the sample location, sample points, probe configuration and operating parameters. The duct velocity traverses and sampling-analysis activities were consistent with HNF-EP-0528-5, *NESHAP Quality Assurance Project Plan for Radioactive Air Emissions.* This NESHAP document was prepared in accordance with *EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations* (QA/R-5) and 40 Code of Federal Regulations 61, Appendix B, Method 114, "Test Methods for Measuring Radionuclide Emissions from Stationary Sources." Sample chain of custody, analytes of interest, minimum detection limits were all managed in accordance with HNF-EP-0528-5, as were data validation and verification as well as calibration of all measuring and test equipment. Dose calculations were made using factors and formulas from *Calculating Potential-to-Emit Releases and Doses for FEMPs and NOCs,* HNF-3602-1. The WSCF Laboratory analyzed the samples in accordance with EPA-prescribed procedures required by Method 114, all in accordance with the *WSCF Laboratory Quality Assurance Plan,* HNF-SD-CP-QAPP-017. Data reduction and review were performed in accordance with HNF-SD-CP-QAPP-017. Further details are included in this document.

BACKGROUND

PUREX History

The 291-A-1 stack is the current discharge point for the PUREX Plant ventilation system. Facility operations began in 1956, with Deep Bed Fiberglass Filter #1 providing primary filtration. In 1964, Deep Bed Fiberglass Filter #2 was added in parallel to Filter #1 to increase the ventilation system capacity. Then in 1985, ten parallel banks with two stages of HEPA filtration were added downstream of the existing fiberglass filters to provide additional exhaust air cleaning. PUREX production operations ceased in 1989, and the facility transitioned to standby and ultimately shut down. In the following years, the building underwent terminal cleanout, which was completed in 1997. All process solutions were removed, and the process vessels were flushed and emptied. The exhaust flow rate was reduced by two thirds in 1997 as exhaust fan operation was reduced from 3 fans to 1. The Deep Bed Fiberglass Filter #1 outlet was isolated from the ventilation system. Filter #2 and two stages of HEPA filtration remain in operation. The PUREX building was then placed in a minimal surveillance and maintenance mode. Activities include stack sampling, calibrations of stack sampling and ventilation system instruments, stack flow testing, HEPA aerosol testing, filter replacements as needed, corrective maintenance to stack sampling and ventilation system equipment, adjustments to ventilation system equipment, and radiological surveys and assessments.

Filtration System Design Details

Deep Bed Fiberglass Filter #1 was designed with downward flow design, which led to filter pluggage and air flow restriction problems in 1964, so Deep Bed Fiberglass Filter #2 was designed and installed in parallel with Filter #1 to improve air flow capacity. Filter #2 was designed to allow 125,000 scfm air flow and to be 99.9% efficient for particulate removal according to original design specifications and the PUREX Process Control Manual, WHC-CM-5-24. Improvements with the #2 filter system included an upward flow design, and a filter drain tank. The #2 filter system was designed for moisture loading and condensate collection. The upward flow design assures that water collected on the filter media drains and therefore transports contaminants towards the "dirty" side and then accumulates in tank V11-10-1. This has a cleansing effect on the filter. The filter media, Owens-Corning 115K Fiberglass, is resilient, non-matting, curly glass-wool material, which requires no resins or binders to maintain filtration properties, and therefore is quite stable under chemical and radiation exposure. It is packed to a 7' depth between a series of stainless steel screens, designed for durability. Filter #2 currently serves as a prefilter and mist-eliminator, upstream of the final two stages of HEPA filtration. The HEPA filtration system is composed of standard design HEPA filters, tested annually to ensure they continue to meet 99.95% efficiency criteria. With the current reduced ventilation (typically about 35,000 scfm), only 3 of the 10 parallel HEPA banks operate at any given time. Further details are included in later sections.

Reassessment
Building cleanout and stabilization, isolation of Filter #1, and the substantial reduction in ventilation air velocities have all contributed to reduced emissions potential. The 291-A-1 stack has remained designated as a major stack, until operations could demonstrate otherwise. Stack emissions have been extremely low, and a definitive assessment was warranted. The remainder of this document details the method used to assess the 291-A-1 stack.

SAMPLING METHOD

In general, the approach for determining the potential (unabated) emissions was to collect a representative air sample upstream of the HEPA filtration. The air concentrations measured represent the concentrations that would potentially be emitted from the facility during an entire year without the HEPA filtration system. Sampling was performed over a period of 12 days during normal facility operations and ventilation system operating conditions.

Sample point selection criteria of 40 CFR 60, Appendix A, Method 1, Section 2.1 were reviewed, but no accessible sampling location was available meeting this criteria, so it was determined necessary to utilize an alternate sampling location. This chosen sampling location provided good access to the duct, directly upstream of the first stage of an operating HEPA filter bank. The duct was accessed through four existing 4" ports, as shown in Figure 2 (the figure shows the sample probe attached to the top 4" port, Port 1; ventilation air flow is from left to right). Velocity and angle measurements were performed in accordance with EPA Method 1, section 2.4, to verify whether cyclonic flow existed. A hot-wire anemometer was used rather than a pitot for the low-velocity measurements for optimal sensitivity and accuracy. The measured velocity profiles are shown in Figure 1. The streamline angles were measured using a Type-S pitot, and results are summarized in Table 1. The streamline angles ranged from 30°- 90° relative to the duct axis. The velocity test procedure and raw data are provided in Attachment 2.

Figure 1

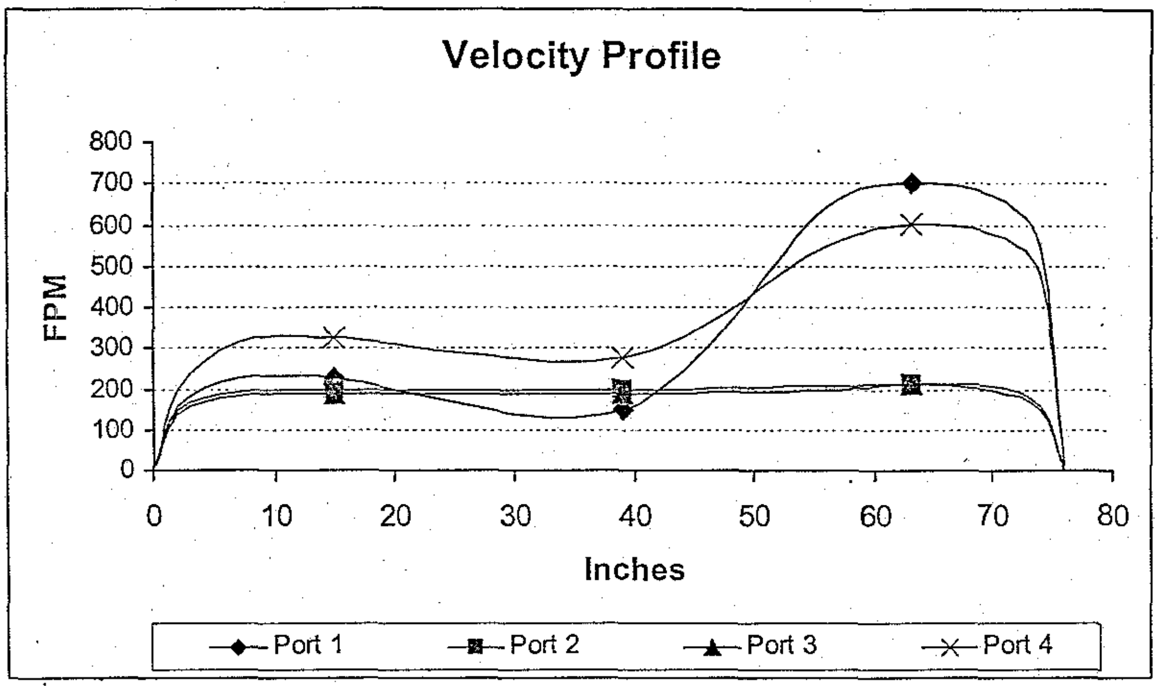


Table 1
Streamline Angle Relative to Duct Axis

Port	Point 1	Point 2	Point 3
1	60°	90°	50°
2	65°	90°	90°
3	60°	90°	90°
4	70°	90°	30°

In each case, the streamline angles exceeded the 20° criteria of EPA Method 1, section 2.4., indicating cyclonic flow. Therefore it was necessary to apply alternative methodology to perform accurate sampling under these flow conditions. Consultation was solicited from ANSI N13.1-1999 Committee member, John Glissmeyer (PNNL), to help determine an appropriate alternate method to provide credible and representative sampling. His calculations confirmed that representative sampling was feasible at this location, because the ventilation air was relatively low velocity, and because there was no backward air flow. However, it would be necessary to perform sampling traverses with appropriate equipment and operating parameters. His calculations assumed large (10 micron) particles, to be conservative. He concluded that even at the worst conditions measured (i.e. the highest velocity and angle), a sample could be obtained at this location with greater than 80% yield (i.e. aspiration efficiency; greater than 80% would enter the probe nozzle). Particle deposition within the probe nozzle might be substantial, but this factor could be eliminated by including probe rinses in the sample analyses. Thus, aspiration efficiency was the key factor. A copy of the report documenting the calculations used to determine aspiration efficiency is provided in Attachment 1, *Modeling Probe Aspiration*, hereafter referenced as the Glissmeyer Report. The report provides graphs that were used to determine sample probe diameter and orientation for the given ventilation air conditions, and graphs that were used to optimize sample flow parameters.

Although Iodine-129 is known to be the highest source of actual emissions dose from the PUREX 291-A-1 stack, iodine sampling was not required because unabated iodine emissions are already collected at the stack (iodine gas is not abated by HEPA filtration). However, since iodine-129 stack emission concentrations are known, iodine was sampled for comparison; to perform the function of a tracer gas and provide additional sample validation.

Sampling Location

The alternate sampling location is at the rectangular HEPA housing duct directly upstream of the first stage of an operating HEPA filter bank (see Figure 2). The 76" x 116" rectangular housing contains 4 rows of 3 HEPA filters. The duct was accessed through four existing 4" ports, as shown in Figure 2. Figure 2 shows the probe attached to the top 4" port, which is Port 1. This alternate location is divided into 12 equal areas, the centroid of each area corresponding to the center of each HEPA filter. The sampling points are the same as the velocity measurement points.

Figure 2

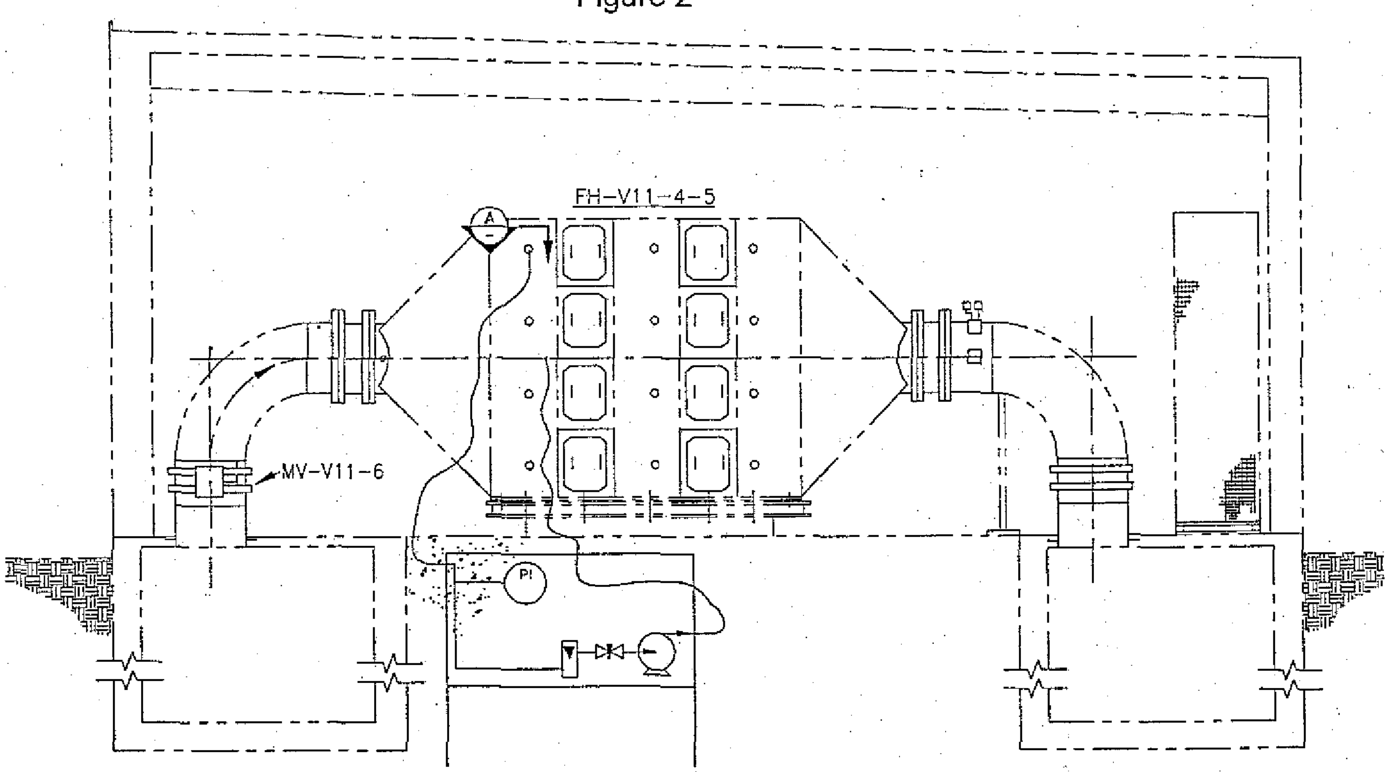
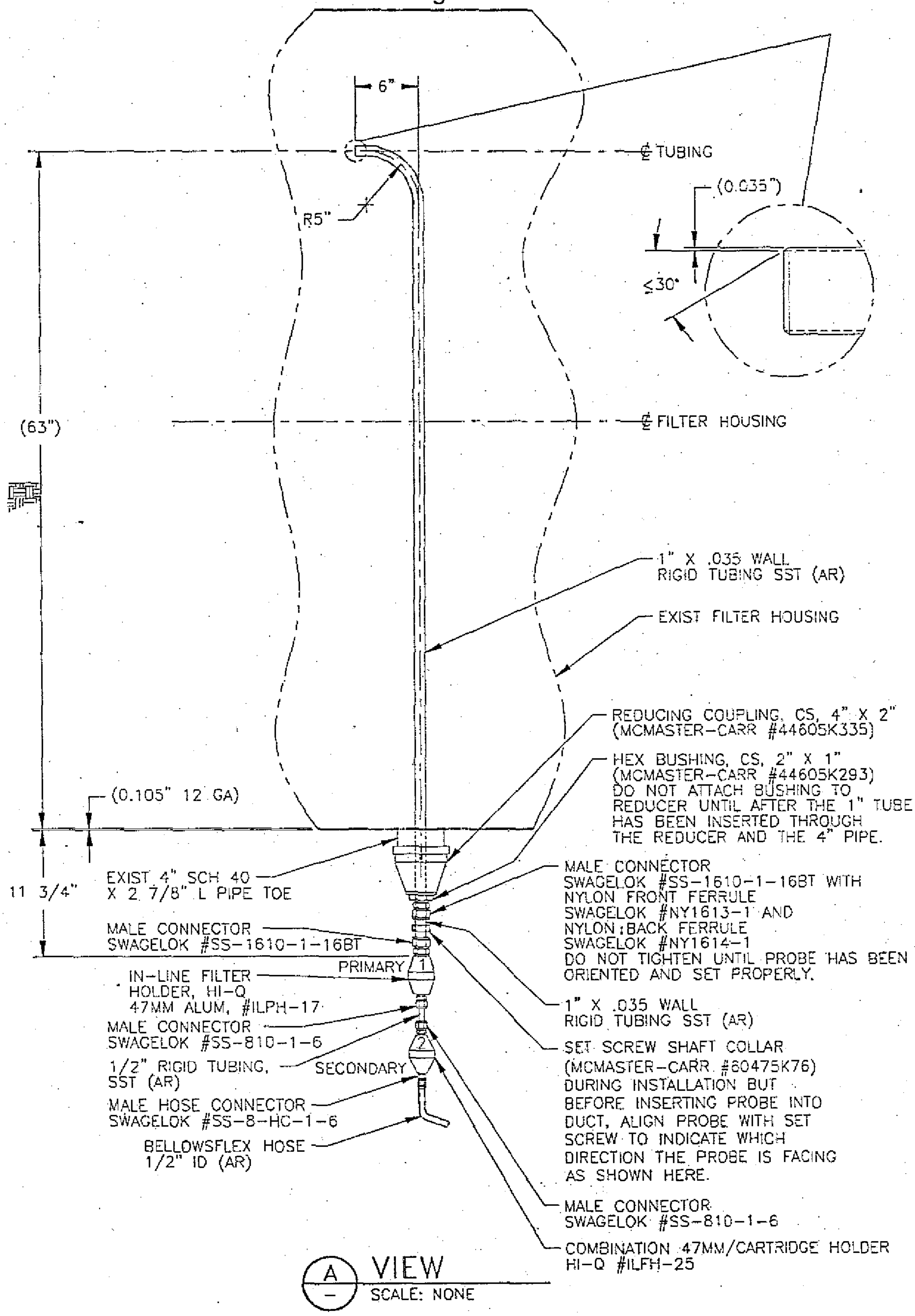


Figure 3


6"
℄ TUBING
R5"
(0.035")
≤30°
(63")
℄ FILTER HOUSING
1" X .035 WALL
RIGID TUBING SST (AR)
EXIST FILTER HOUSING
REDUCING COUPLING, CS, 4" X 2"
(MCMASTER-CARR #44605K335)
HEX BUSHING, CS, 2" X 1"
(MCMASTER-CARR #44605K293)
DO NOT ATTACH BUSHING TO REDUCER UNTIL AFTER THE 1" TUBE HAS BEEN INSERTED THROUGH THE REDUCER AND THE 4" PIPE.
(0.105" 12 GA)
11 3/4"
EXIST 4" SCH 40
X 2 7/8" L PIPE TOE
MALE CONNECTOR
SWAGELOK #SS-1610-1-16BT WITH
NYLON FRONT FERRULE
SWAGELOK #NY1613-1 AND
NYLON BACK FERRULE
SWAGELOK #NY1614-1
DO NOT TIGHTEN UNTIL PROBE HAS BEEN ORIENTED AND SET PROPERLY.
MALE CONNECTOR
SWAGELOK #SS-1610-1-16BT
PRIMARY
1
IN-LINE FILTER
HOLDER, HI-Q
47MM ALUM, #ILPH-17
1" X .035 WALL
RIGID TUBING SST (AR)
MALE CONNECTOR
SWAGELOK #SS-810-1-6
1/2" RIGID TUBING,
SST (AR)
SECONDARY
2
SET SCREW SHAFT COLLAR
(MCMASTER-CARR #60475K76)
DURING INSTALLATION BUT BEFORE INSERTING PROBE INTO DUCT, ALIGN PROBE WITH SET SCREW TO INDICATE WHICH DIRECTION THE PROBE IS FACING AS SHOWN HERE.
MALE HOSE CONNECTOR
SWAGELOK #SS-8-HC-1-6
BELLOWSFLEX HOSE
1/2" ID (AR)
MALE CONNECTOR
SWAGELOK #SS-810-1-6
COMBINATION 47MM/CARTRIDGE HOLDER
HI-Q #ILFH-25
A
–
VIEW
SCALE: NONE

Sampling Equipment

The sampling system included a sample probe, a primary particulate sample filter holder, and a secondary combination sample filter and silver zeolite cartridge holder, as shown in Figure 3. It also included a vacuum gage, rotameter, flow control valve and vacuum pump, as shown schematically in Figure 2. The vacuum gage and rotameter were calibrated prior to use. The sample probe tubing was 1" OD x .035" wall thickness, i.e. 0.93" ID as evaluated and optimized in the Glissmeyer Report. The probe was mounted through existing ports, as shown in Figure 3. The primary sample filter holder was mounted directly onto the end of the sample probe. Versapor 3000 particulate sample filters were used, as listed and characterized in ANSI N13.1-1999, Annex D, Table D.1. The primary sample filter, the secondary sample filter and the probe itself were each considered components of the sampling media because all would be analyzed for radioisotopes. This was to ensure a quantitative sample, and to account for any line losses. The silver zeolite cartridge was provided to collect iodine-129 gas.

Sampling Operation

Sampling was performed for one day at each of 12 positions, corresponding to each of the 12 HEPA filter faces. The sample flow rate was set at 3.0 scfm to ensure optimal sampling performance, in accordance with the Glissmeyer Report evaluation. The sampling procedure, daily inspection reports and chain-of-custody data are provided in Attachment 3.

The 12-day sampling upstream of the primary HEPA filter bank was completed on March 8. The sample was held for a week to allow radon to decay off, and then shipped to the WSCF Lab on March 15. The probe was cut into four ~18" segments for lab handling purposes.

Laboratory Analysis

The isotopic radionuclide analyses were chosen based on known constituents from stack sample data; corroboration of the GEA and Total Alpha/Beta with isotopic results assured a comprehensive assay. The laboratory radionuclide analyses requested were as follows: Gross Alpha/Beta on the primary and secondary sample filters and on each of 3 sequential probe rinses, then Gamma Energy Analysis (GEA), Pu isotopic, Am-241, and Sr-90 on the composite sample filters, and GEA, Pu isotopic, Am-241, and Sr-90 on the composite probe rinses. The three individual acid rinses of the probe and individual rinse analyses assured thorough removal of sample deposits. The sample filter results and the composite probe rinses together provided a quantitative particulate sample. The silver zeolite cartridge provided an iodine gas sample.

SAMPLE ANALYSIS RESULTS

Results

The particulate sample filter collection efficiency was assumed to be 99.7%, based on the published ANSI N13.1-1999, Annex D value of 99.7 – 99.99% for Versapor 3000 filters. Since two filters were used in series, the overall sample filter particulate collection efficiency was 99.999%, effectively 100%. The activities of detected radionuclides as derived from this report are summarized in the following tables; the complete lab report and data are provided in Attachment 4. The composite sample filters and silver zeolite cartridge results are listed in Table 2. The probe rinse composite results are listed in Table 3. The composite probe rinse results were added to the composite filter results to obtain a combined total sample radioactivity result, as listed in Table 4.

Table 2
Composite Sample Filters and Silver Zeolite Cartridge Laboratory Results

Radionuclide Isotope	Lab Results (pCi)
^{241}Am	0.45
^{238}Pu	0.11
^{239,240}Pu	0.66
Total Beta	ND
Total Alpha	ND
^{129}I	5160

Table 3
Composite Probe Rinse Results

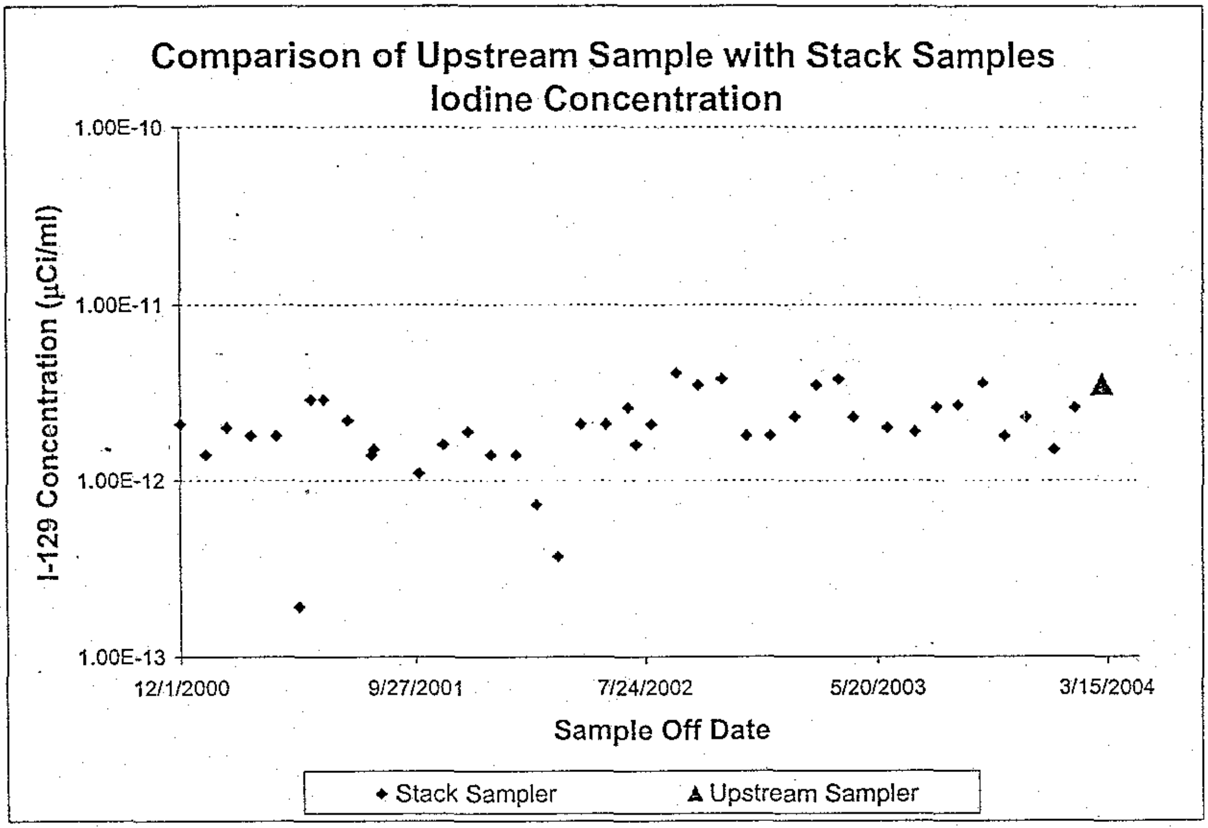
Radionuclide Isotope	Results for 725 mL Aliquot (pCi/L)	Total Probe Rinse Result (pCi/Sa)
^{239,240}Pu	2.00	2.90

Table 4
Combined Composite Sample Filters, Composite Probe Rinses and Silver Zeolite Cartridge (Iodine) Results

Radionuclide Isotope	Total Sample Radioactivity (pCi/Sa)
^{241}Am	0.45
^{238}Pu	0.11
^{239,240}Pu	3.56
^{129}I	5160

The iodine-129 concentrations were sampled and found to be within the range of normal stack emission sample concentrations, thereby providing additional sample validation. This is illustrated in the following graph, Figure 4.

Figure 4



Conclusions

The low particulate radionuclide results confirm that there are minimal concentrations of airborne radioactive particulate within the current low-velocity ventilation system.

UNABATED POTENTIAL EMISSIONS ESTIMATE

Air concentrations were measured upstream of the HEPA filters through representative sampling and analysis, then the potential unabated emissions were calculated. Results of these calculations are listed in Table 5. Particulate air sample results were adjusted for 83% collection efficiency (i.e. probe nozzle aspiration efficiency, per Glissmeyer Report, Attachment 1). Iodine air sample results were adjusted for 82% collection efficiency, in accordance with silver zeolite cartridge performance certifications. The potential emissions upstream of the HEPA filters were calculated by multiplying the measured radionuclide concentrations by the annual discharge volume. Then particulate radionuclide results were back-calculated to determine potential unabated emissions upstream of the Deep Bed Fiberglass Filter (i.e. prefilter). This back-calculation assumes 99.97% prefilter efficiency, which is conservative considering the 99.9% prefilter design rating and historical efficiency measurements. Then actual annual particulate emissions were added in to ensure any possible contribution from contaminated ducts downstream of the HEPAs was included. The potential offsite dose to the Maximum Public Receptor (MPR) was then calculated. The results are listed in Table 6. These were calculated by multiplying the potential unabated emissions by unit dose factors, as derived from the CAP88-PC program, as documented in HNF-3602-1, *Calculating Potential-to-Emit Releases and Doses for FEMPs and NOCs.*

The following is a list of parameters and assumptions used in the potential unabated emissions calculations:

- Sample flow rate: 3.0 scfm
- Sample duration: 12 days and 110 minutes (17,390 min)
- Stack operation: 365 days/yr
- Stack flow: 35,000 scfm*
- Stack height: 200 ft (61 m)
- Deep Bed Fiberglass Filter (prefilter) decontamination factor: 3000
- Particulate collection efficiency (i.e. aspiration efficiency): 83%
- Iodine silver zeolite cartridge collection efficiency @ 3 scfm: 82%

* Stack flow measured 32,000 scfm April 2003, and 35,000 scfm April 2004. The higher stack flow rate was chosen for conservative emissions calculations.

Table 5
Potential Unabated Emissions Estimate for Stack 291-A-1

Radionuclide Isotope	Total Sample Radioactivity (pCi/Sa)	Collection Efficiency-Corrected Total Sample Activity (pCi/Sa)	PTE Upstream of HEPA Filters (Ci/yr)	PTE Upstream of Prefilter (Ci/yr)	CY 2003 Stack Actual Emissions, (Ci/yr)	Total Unabated PTE (Ci/yr)
^{241}Am	0.45	0.5422	1.91 E-7	5.74 E-4	2.0 E-6	5.76 E-4
^{238}Pu	0.11	0.1325	4.67 E-8	1.40 E-4	3.8 E-8	1.40 E-4
^{239,240}Pu	3.56	4.2892	1.51 E-6	4.54 E-3	5.5 E-7	4.54 E-3
^{129}I	5160	6293	2.22 E-3	2.22 E-3	(1.4 E-3)	2.22 E-3
^{137}Cs	-	-	-	-	1.2 E-5	1.2 E-5
^{90}Sr	-	-	-	-	3.1 E-6	3.1 E-6

Table 6
Potential Offsite Dose to the MPR from Stack 291-A-1

Radionuclide Isotope	Total Unabated PTE (Ci/yr)	Unit Dose Factor (mrem/Ci)	Potential Offsite Dose to the MPR (mrem/yr)
^{241}Am	5.76 E-4	8.2	4.72 E-3
^{238}Pu	1.40 E-4	5.0	7.01 E-4
^{239,240}Pu	4.54 E-3	5.4	2.45 E-2
^{129}I	2.22 E-3	0.48	1.07 E-3
^{137}Cs	1.2 E-5	0.16	1.92 E-6
^{90}Sr	3.1 E-6	.076	2.36 E-7
		Total Dose:	3.10 E-2

ATTACHMENT 1

GLISSMEYER REPORT:

Letter; Modeling Probe Aspiration, Rev. 0; Equations
John Glissmeyer
PNNL

Pacific Northwest National Laboratory
Operated by Battelle for the
U.S. Department of Energy

May 27, 2004

Dan Johnson
Fluor Hanford, Inc.
P.O. Box 1000
Richland, WA 99352-1000

Dear Mr. Johnson:

In collecting air samples from air streams, the conventional approach is to extract the sample with a nozzle aligned with the direction of the airflow. In the case of the HEPA filter housing inlets at the Purex Plant, measurements made by Fluor indicated that the air velocity vectors may not be aligned with the direction of the bulk airflow through the housings. Furthermore, the misalignment varied with position in the inlet cross section. Consequently, calculations were performed to estimate the possible range of bias in air samples taken from that location. The bias is in the form of the aspiration efficiency as a function of the free stream velocity, the sample flowrate, nozzle diameter, and the yaw angle of the nozzle relative to the local velocity vector.

The enclosed presentation presents the results of modeling aspiration efficiency for this application. The calculations were made for a particle diameter of 10μm and a density of 1 g/cc. The equations used for the calculations are detailed in the attached note "*Calculating Sampling Aspiration Efficiency for Purex HEPA Filter Housings to Estimate Potential Impact of Off-Axis Sampling* (John Glissmeyer, PNNL, March 23, 2004)." The Microsoft Excel spreadsheet used for the calculations is available on request. The plots shown in the presentation come directly from the spreadsheet.

In the presentation, the observation was made that for a nozzle with an inlet diameter of 0.93-in. and a flowrate of around 3 cfm, that the aspiration efficiency should be greater than 80% for yaw angles from 0 – 90° and for an air velocity range of 200 – 700-fpm. Some combinations of parameters could result in aspiration efficiency slightly greater than unity, which is not a concern.

For the proposed sampling probe of 0.93" ID tubing and a flowrate of 3 cfm, the sample bias due to misalignment would be about 0.83.

Please feel free to contact me if you have further questions.

Sincerely,

John Glissmeyer

John Glissmeyer
Environmental Technology Directorate
Chief Engineer

JAG: jnw

902 Battelle Boulevard • P.O. Box 999 • Richland, WA 99352

Telephone (509) 375-4345 ■ Email ja.glissmeyer@pnl.gov ■ Fax (509) 375-2019

Attachment

cc: L.P. Diediker, Fluor Hanford, Inc., MS H8-13
D.L. Dyekman, Fluor Hanford, Inc., MS H8-13

Modeling Probe Aspiration Revision 0

John Glissmeyer
PNNL
May 20, 2004

Battelle

Pacific Northwest National Laboratory
Operated by Battelle for the U.S. Department of Energy

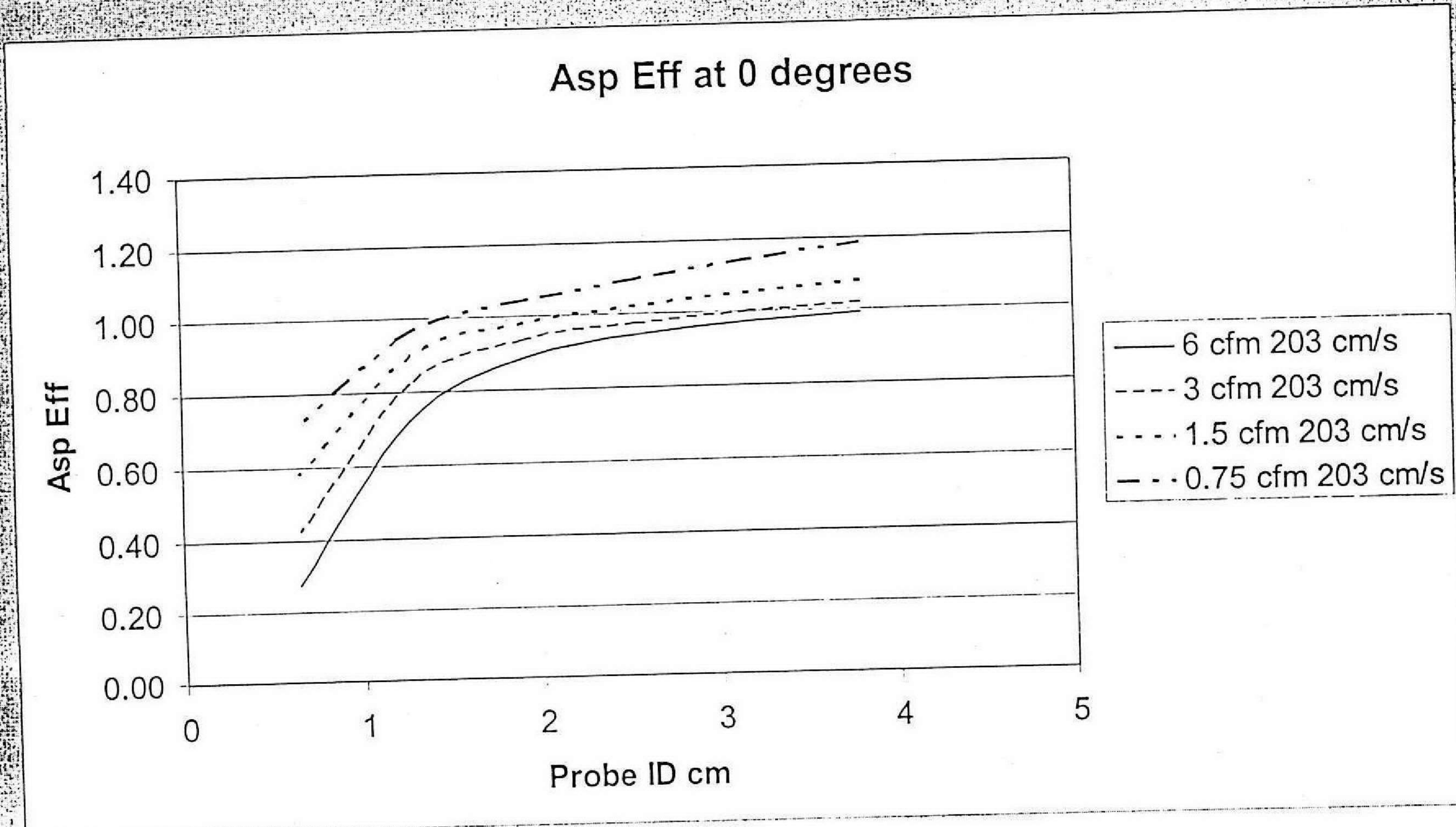
Assumptions

- All calculations assumed
  - Particle diameter of 10µm
  - Particle density 1 g/cc
  - Sea level pressure
  - Room temperature
  - Thin wall, straight walled probe

Explore Nozzle and Flowrate

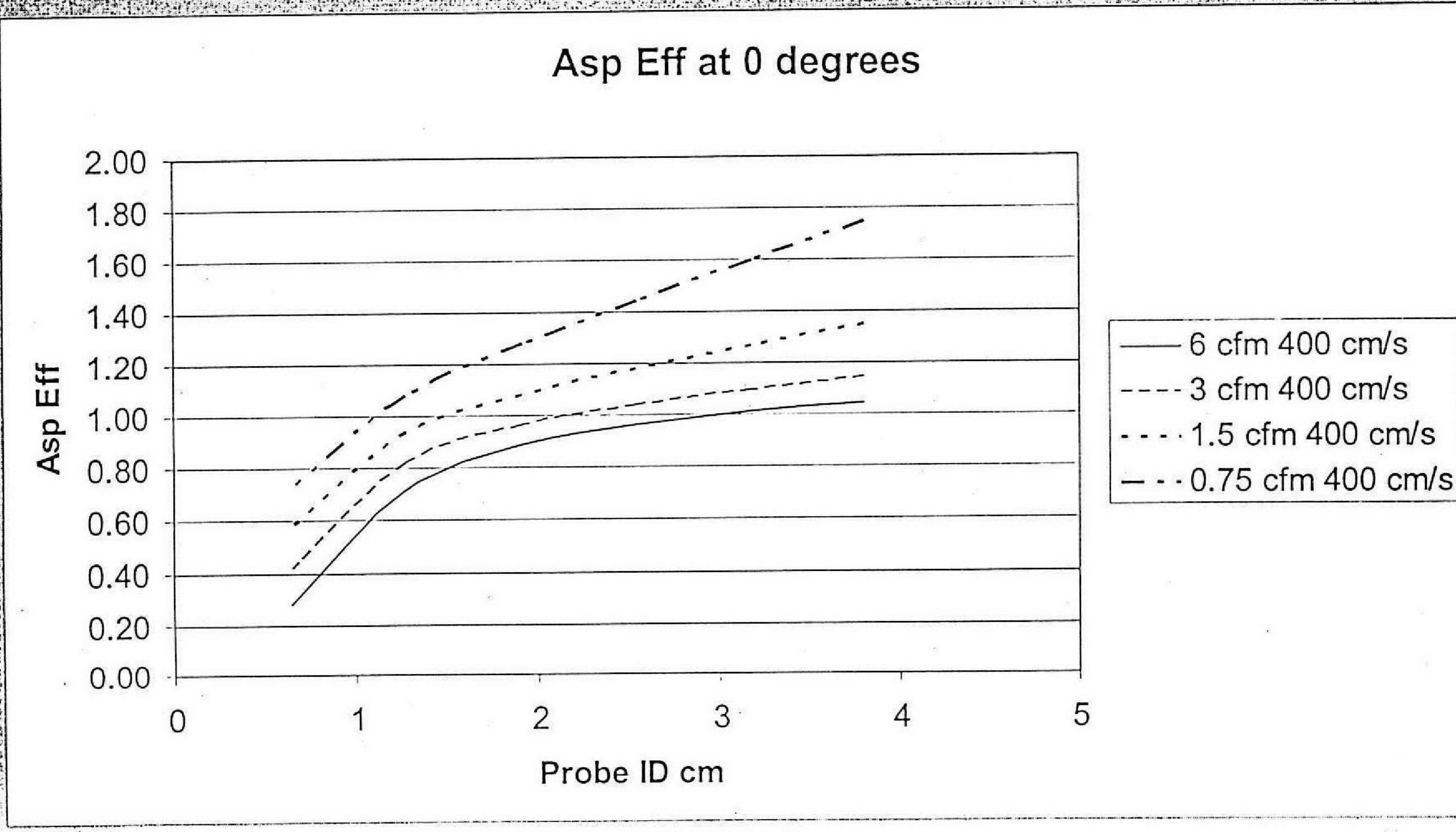
- The following slides explore aspiration efficiency for a range of sampling nozzle sizes and flowrate
- Calculated for various yaw angles and air velocity in the duct

At 0 deg, 203 cm/s; f: flowrate, probe size
Asp. Eff. decreases with sample flow and increases with probe size

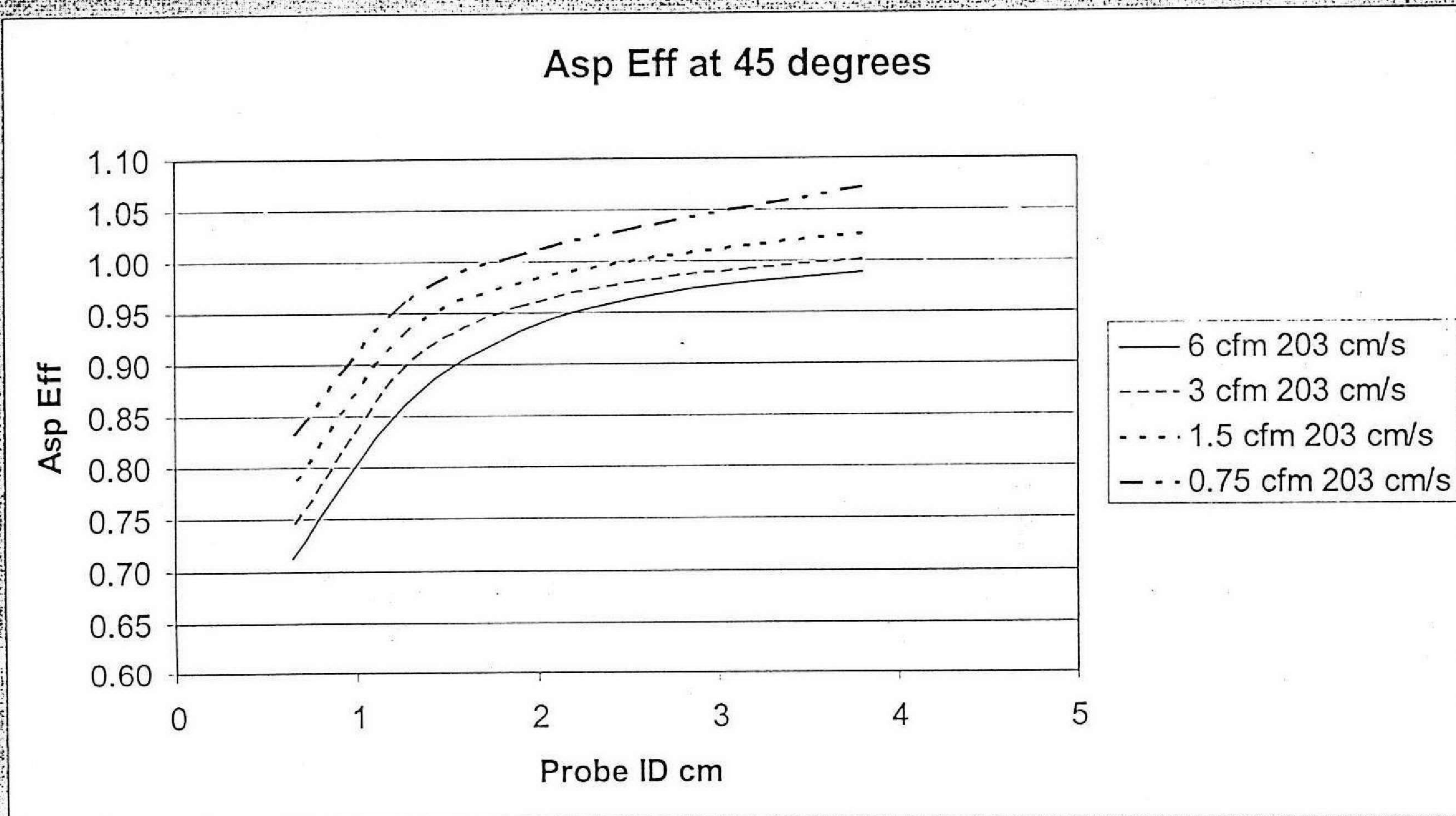


Battelle

At 0 deg, 400 cm/s; f: flowrate, probe size
Asp. Eff. decreases with sample flow and increases with probe size



At 45 deg, 203 cm/s; f: flowrate, probe size
Asp. Eff. decreases with sample flow and increases with probe size



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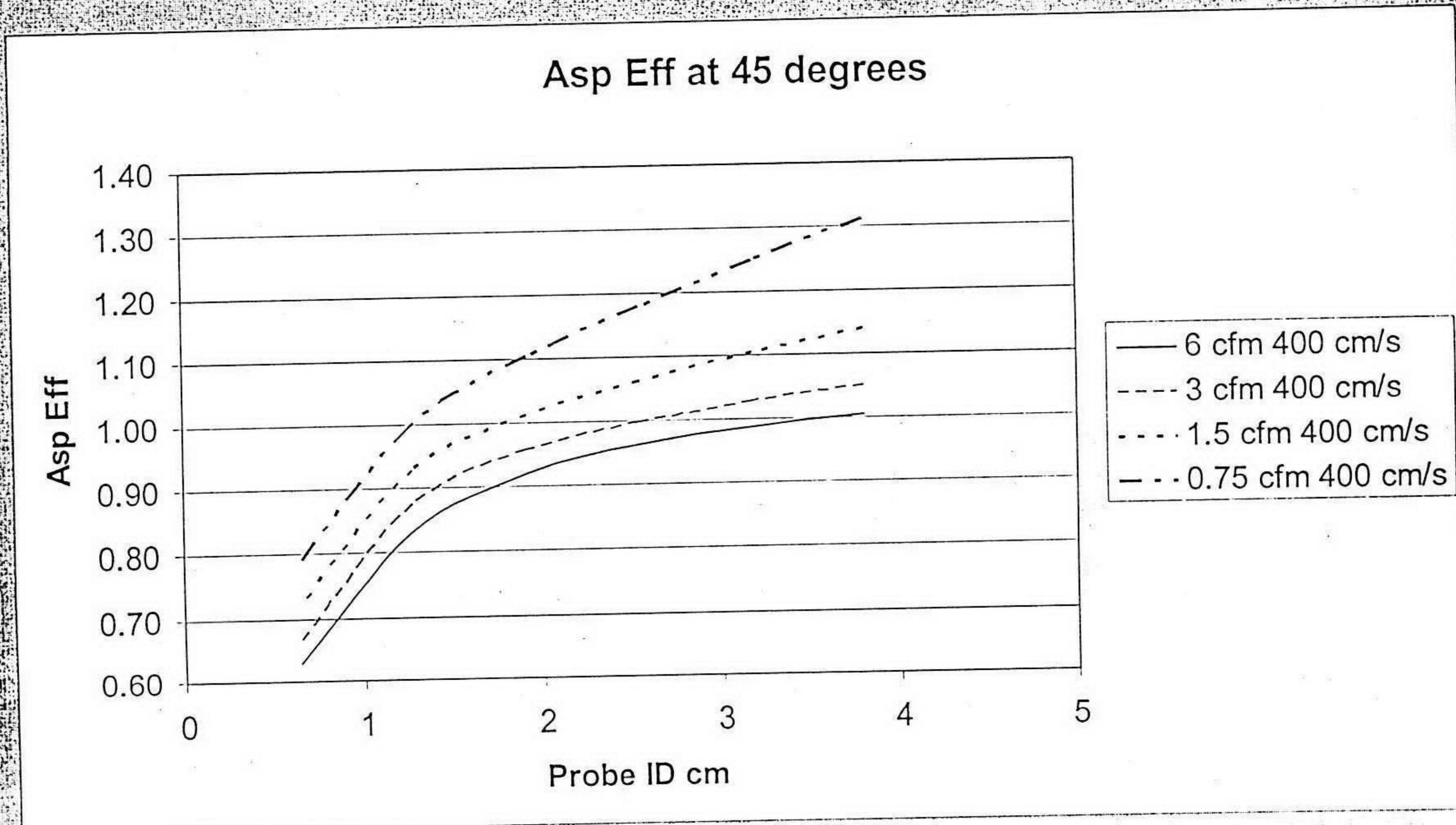
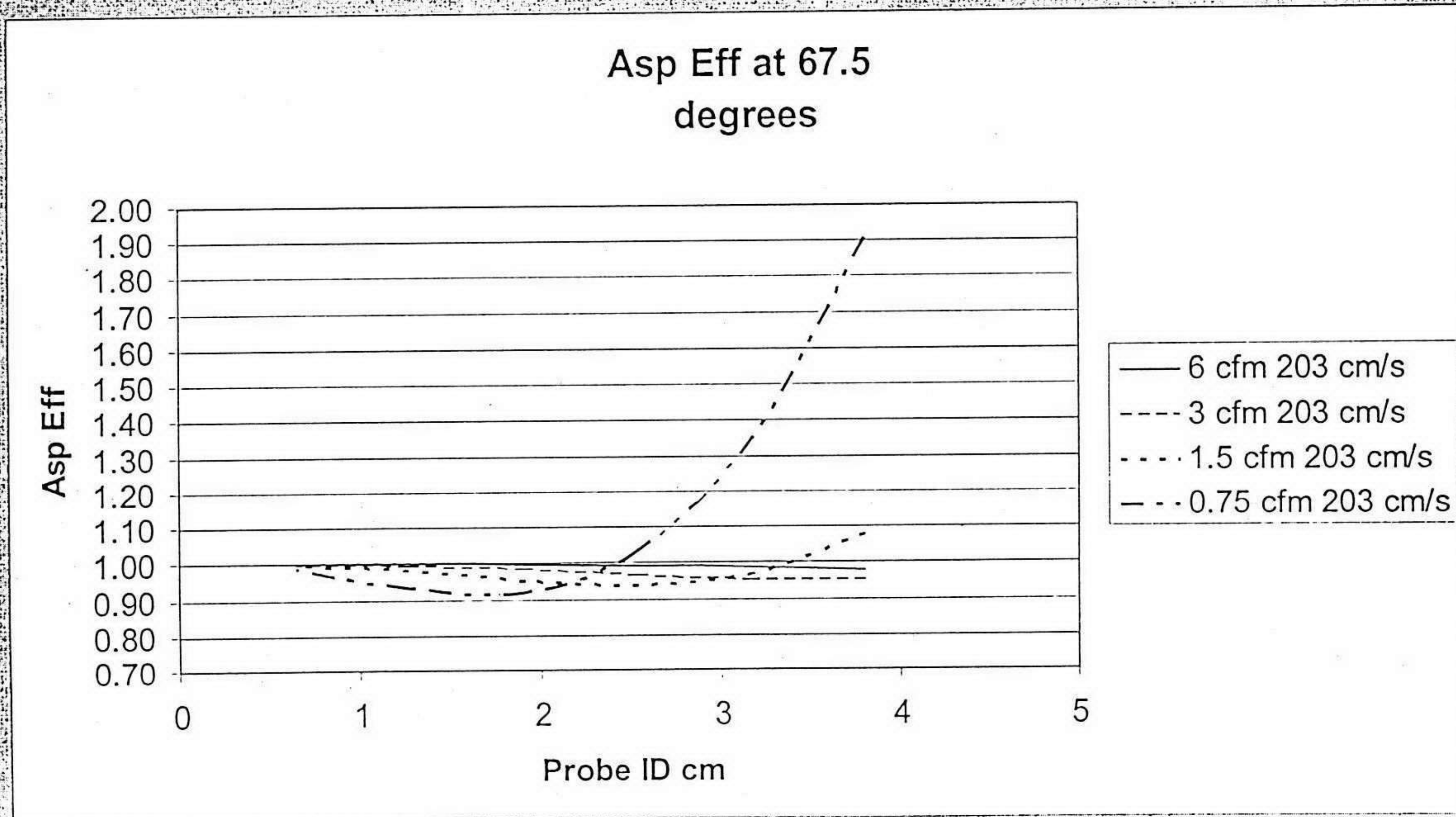
U.S. Department of Energy 6

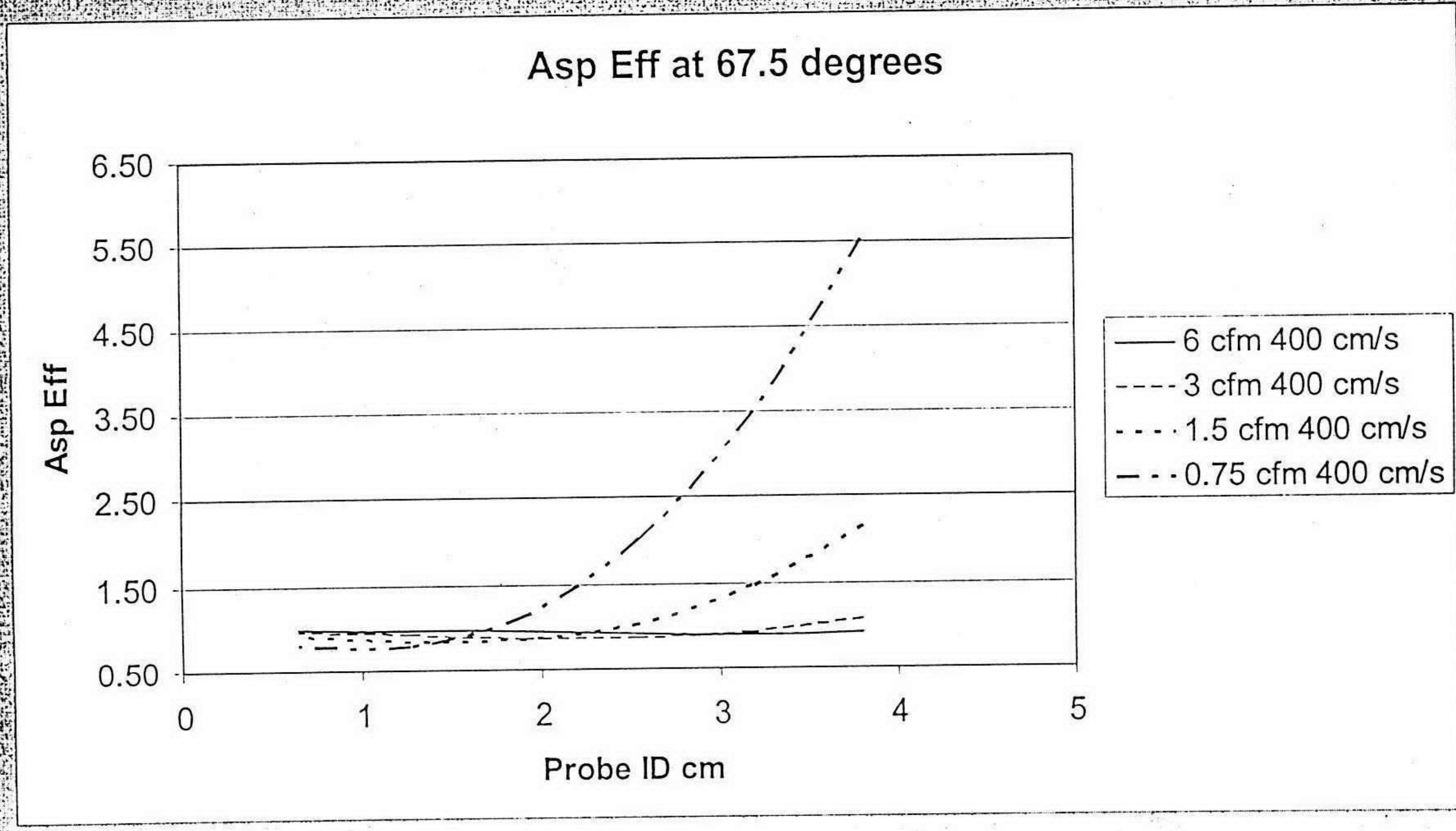
At 45 deg, 400 cm/s; f: flowrate, probe size
Asp. Eff. decreases with sample flow and increases with probe size



At 67.5 deg, 203 cm/s; f: flowrate, probe size
Asp. Eff. constant for flowrates above 1.5 cfm



At 67.5 deg, 400 cm/s; f: flowrate, probe size
Asp. Eff. Constant for flowrates above 3 cfm



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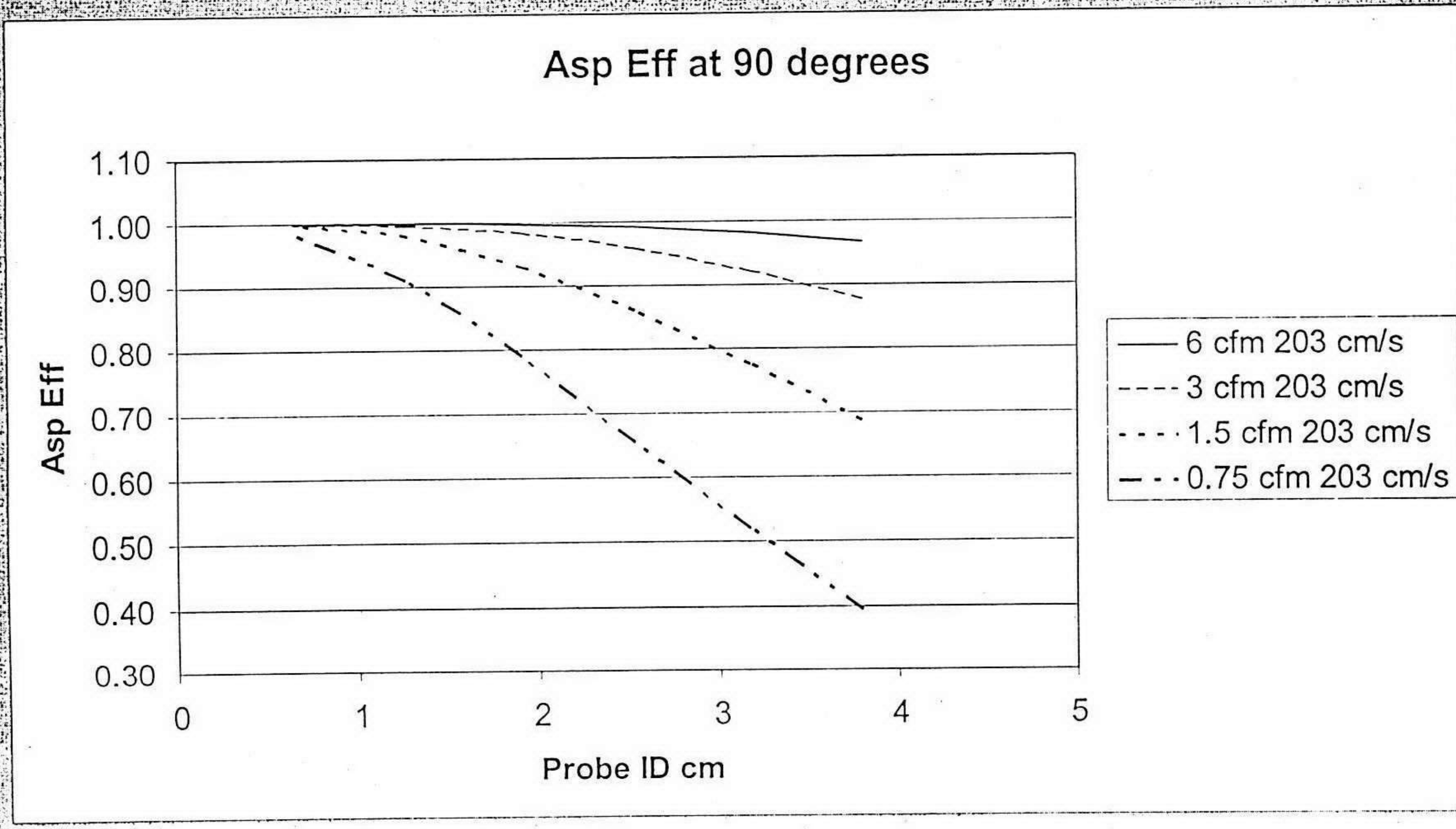
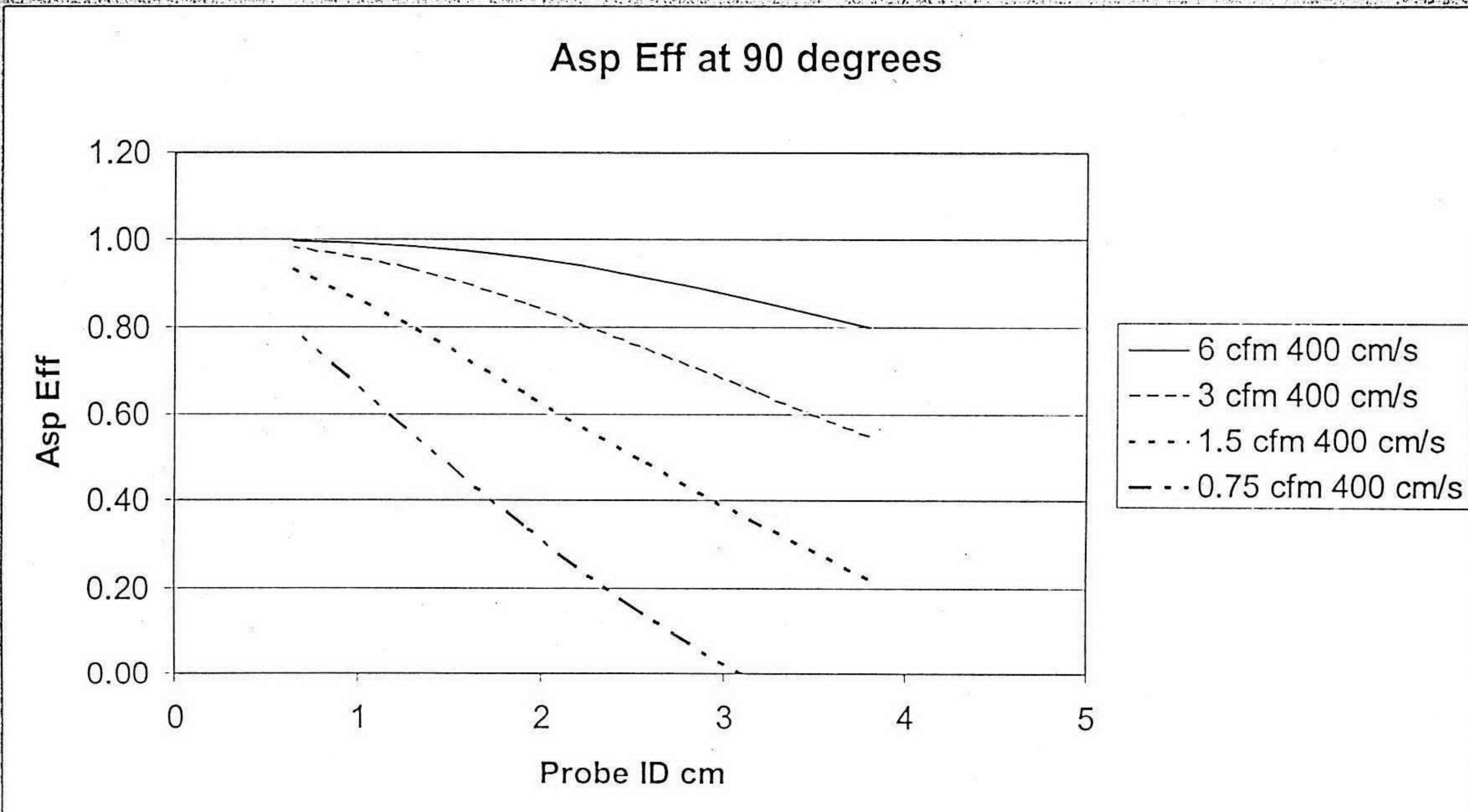
At 90 deg, 203 cm/s; f: flowrate, probe size
Asp. Eff. increases with sample flow and decreases with probe size



At 90 deg, 400 cm/s; f: flowrate, probe size
Asp. Eff. increases with sample flow and decreases with probe size



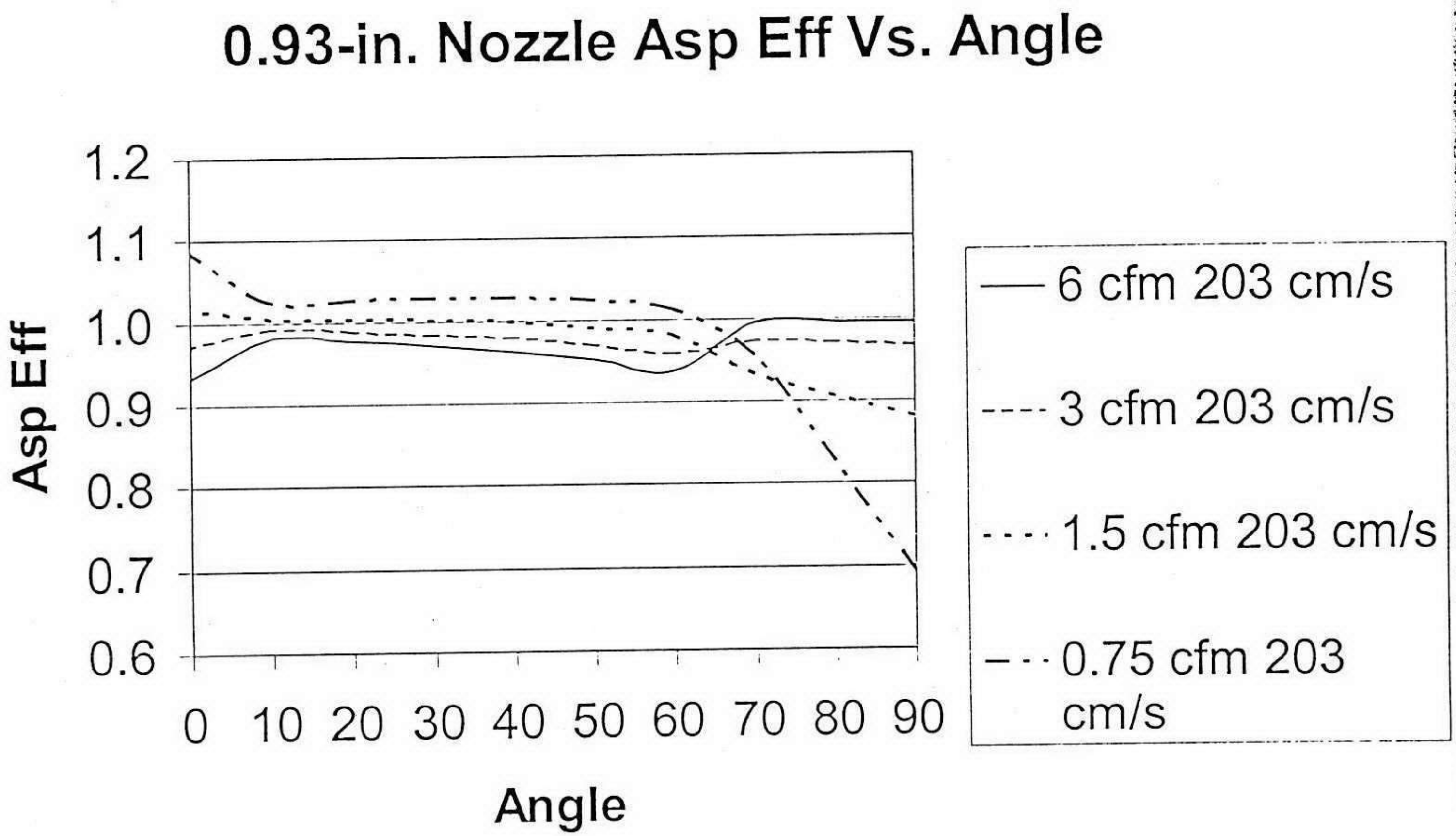
Optimizing for angle

- At 0° and 45°, efficiency improves as the nozzle gets larger and the flowrate gets lower
- The opposite is true at 90°
- At 67.5°, efficiency more constant as flowrate increases
- Because the flow angle is expected to be between 45° and 90°, the best compromise for aspiration efficiency appears to be around a 2 cm ID probe with a flowrate of around 3 cfm
- With that setup, the aspiration efficiency should be >80% at any angle

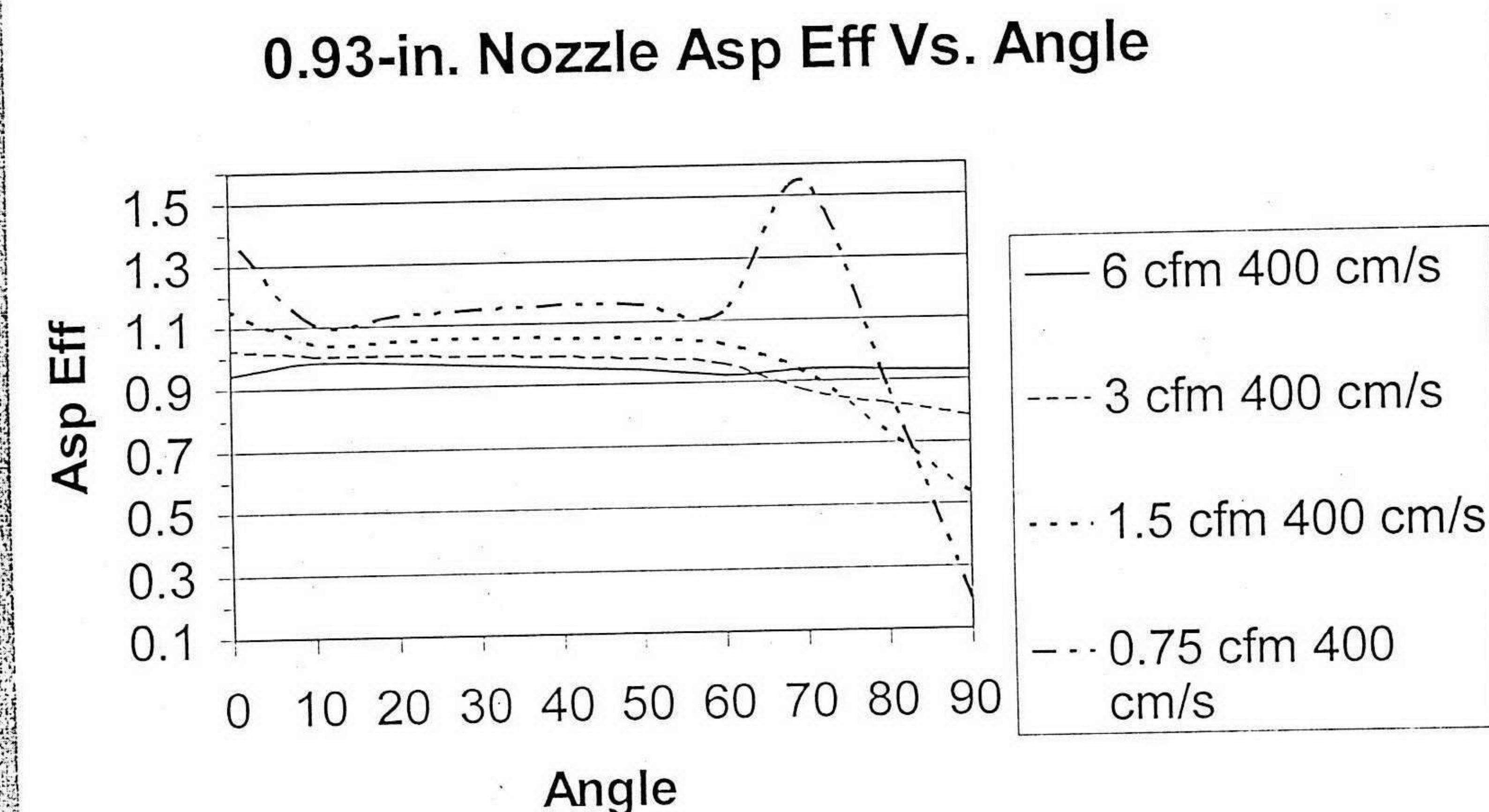
Optimizing for 0.93-in nozzle

- The following plots show aspiration efficiency as a function of angle, sample flowrate, and duct air velocity for the 0.93-in nozzle actually used in the air sampling
- Nozzle size chosen to be that of commonly available tubing

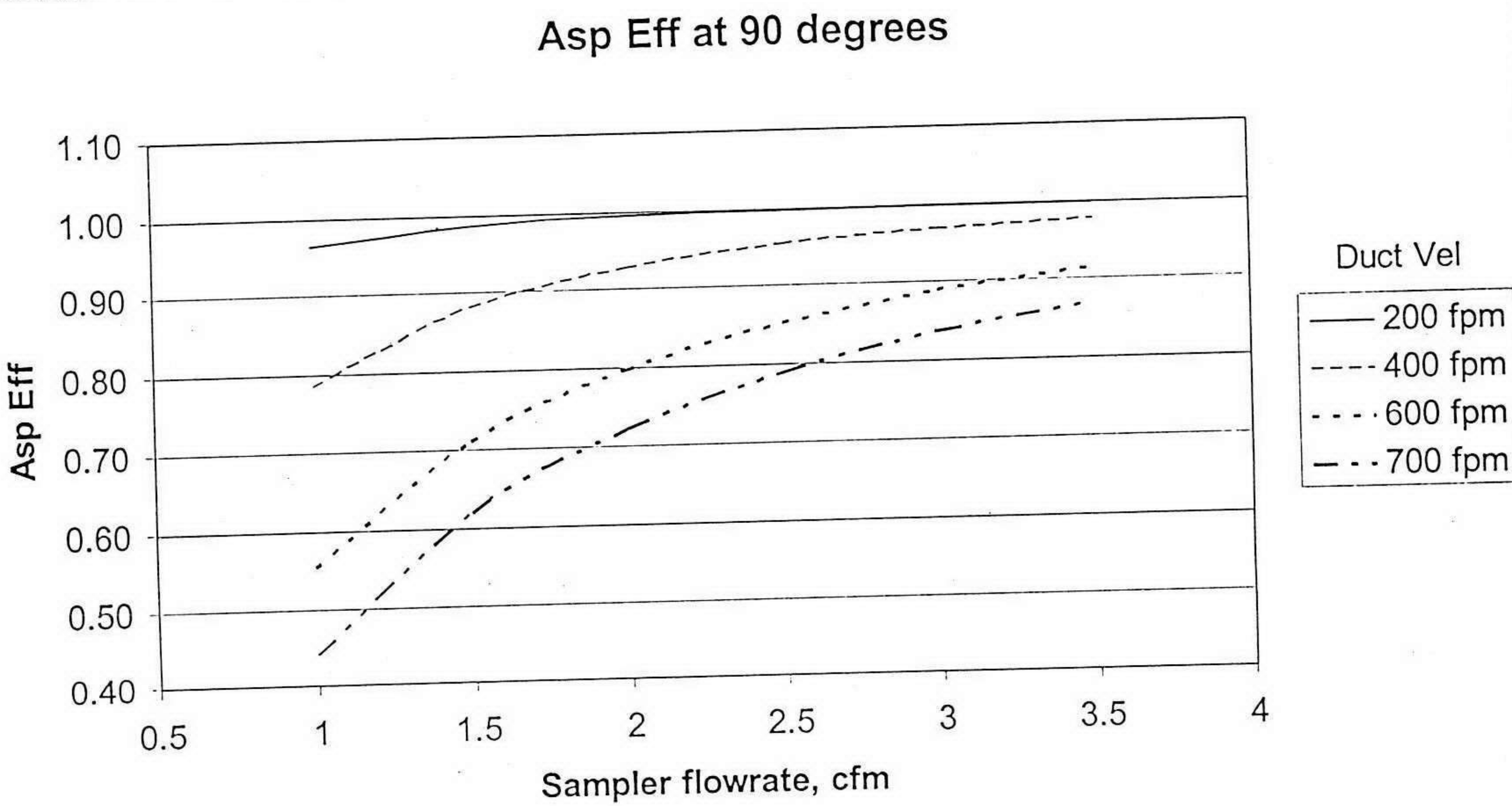
Optimizing for angle at 203 cm/s



Optimizing for angle at 400 cm/s



Asp Eff for 0.93-in nozzle at 90°



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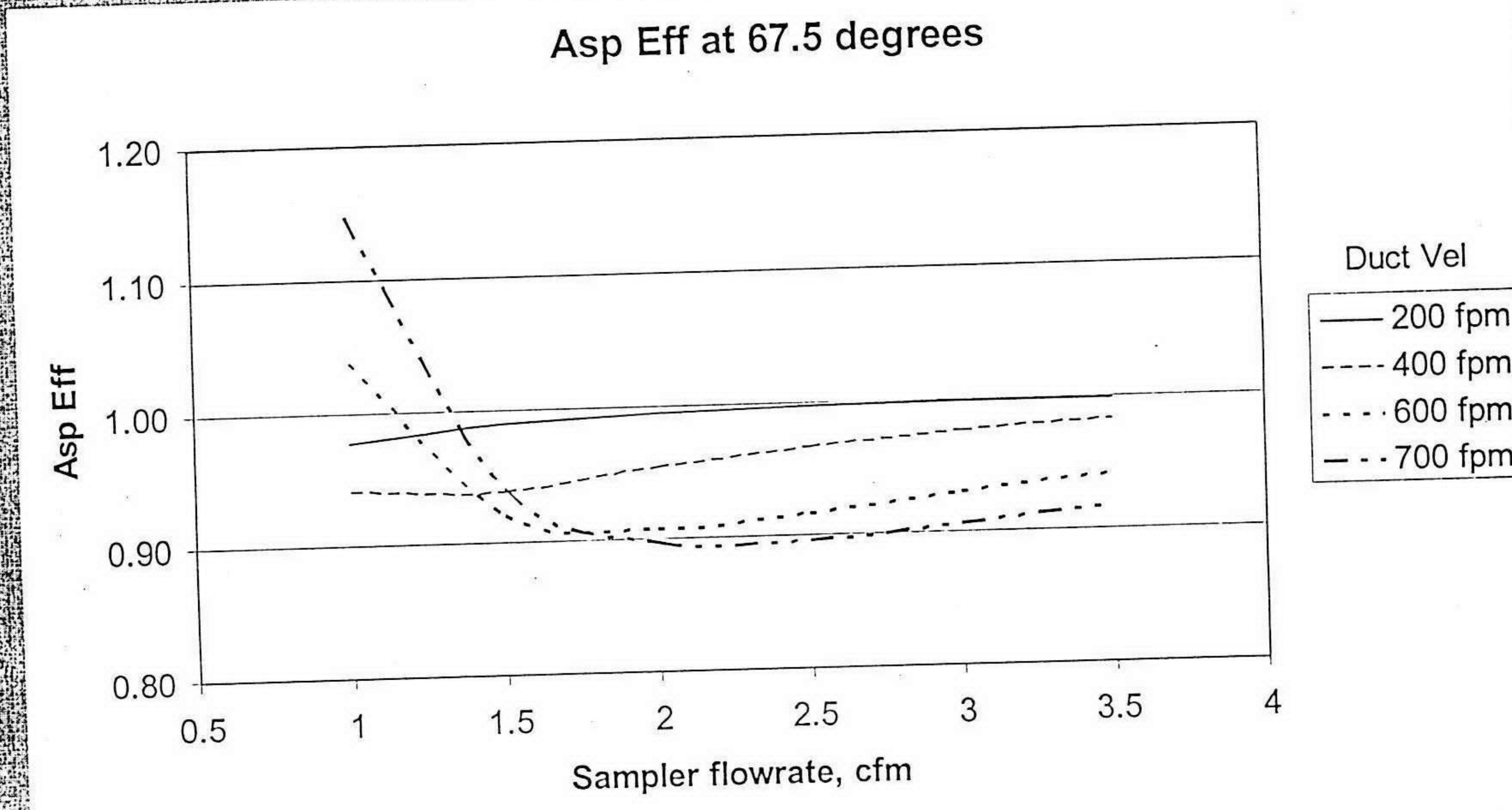
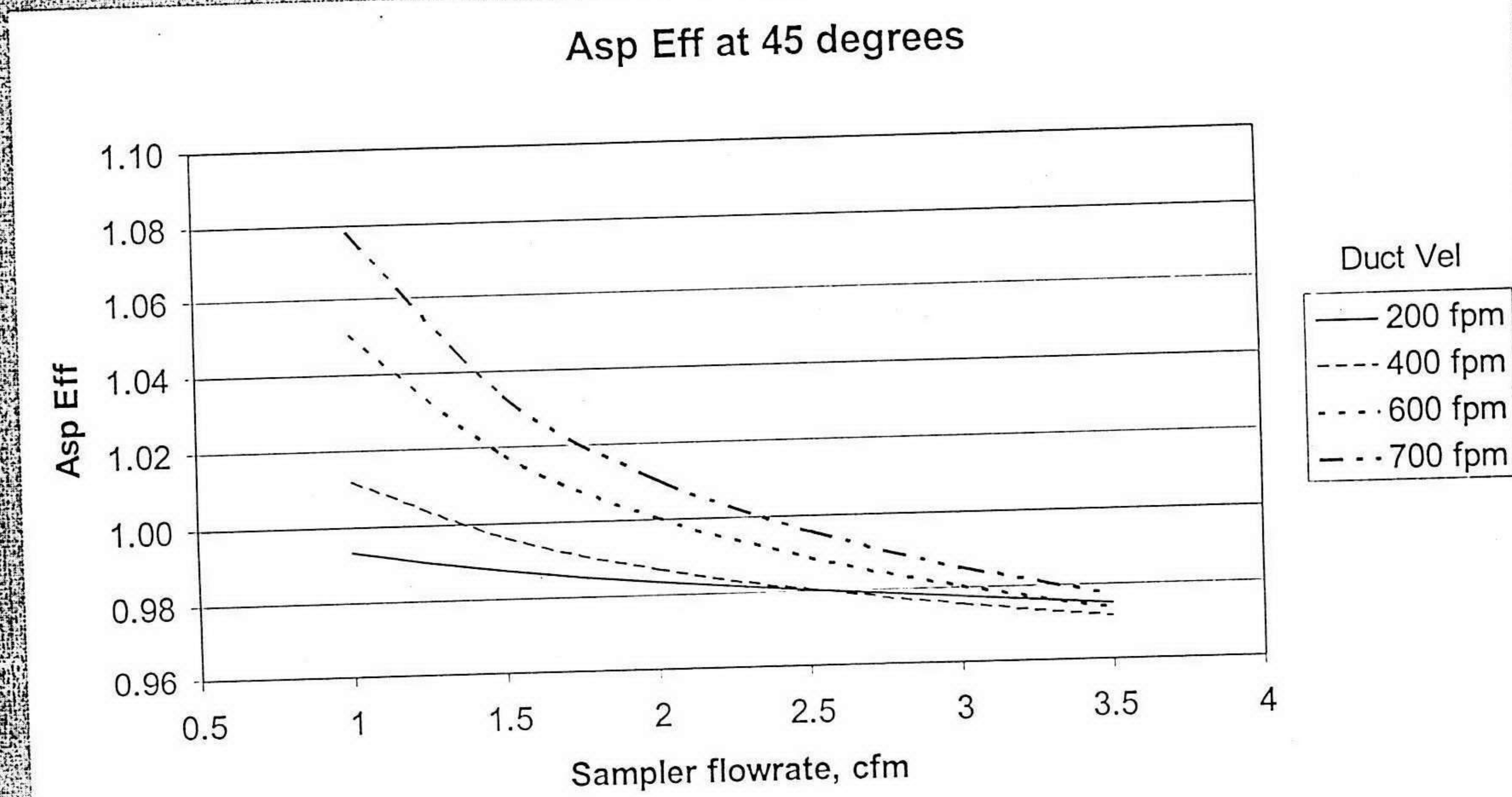
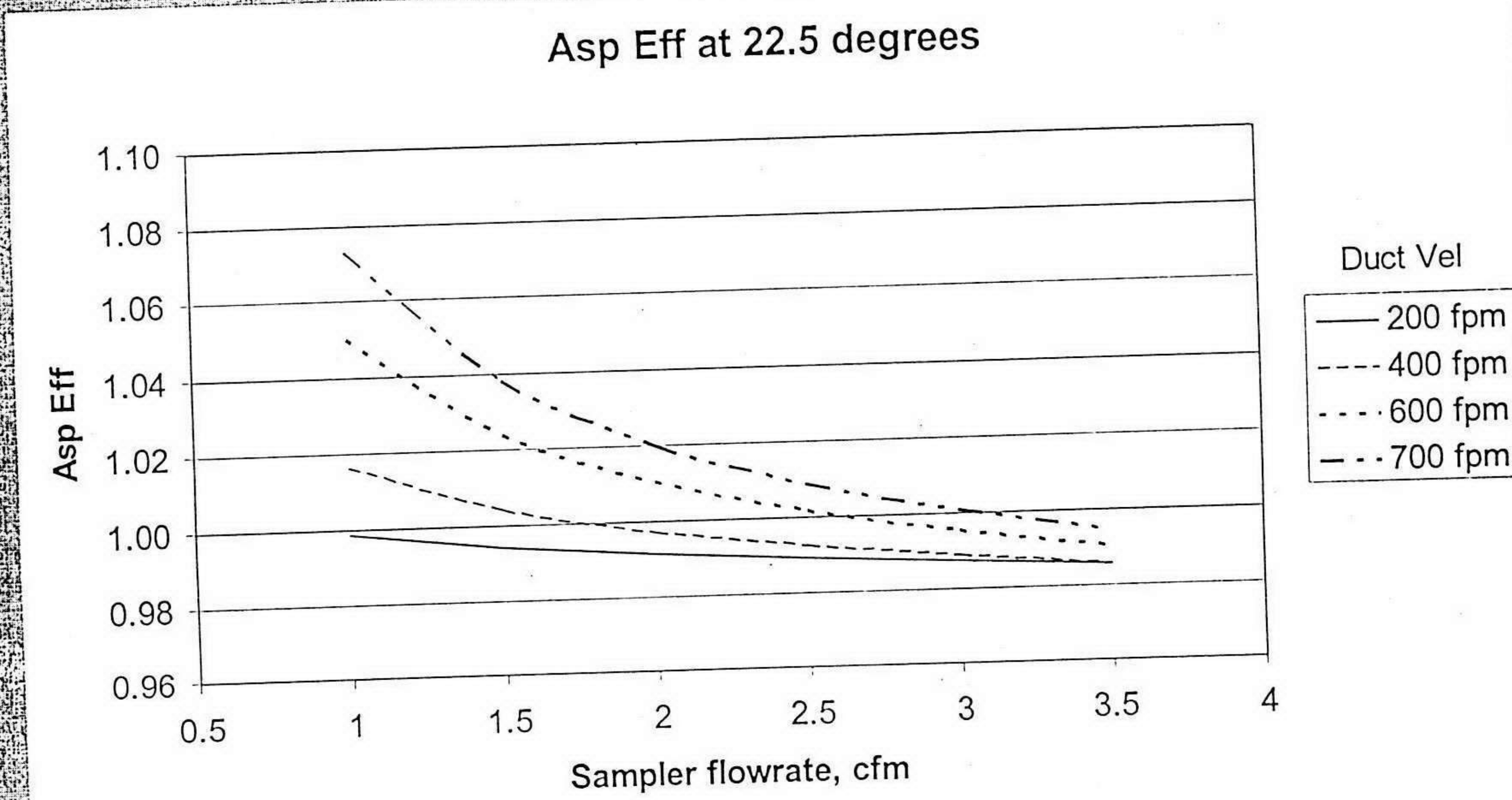
Asp Eff for 0.93-in nozzle at 67.5°



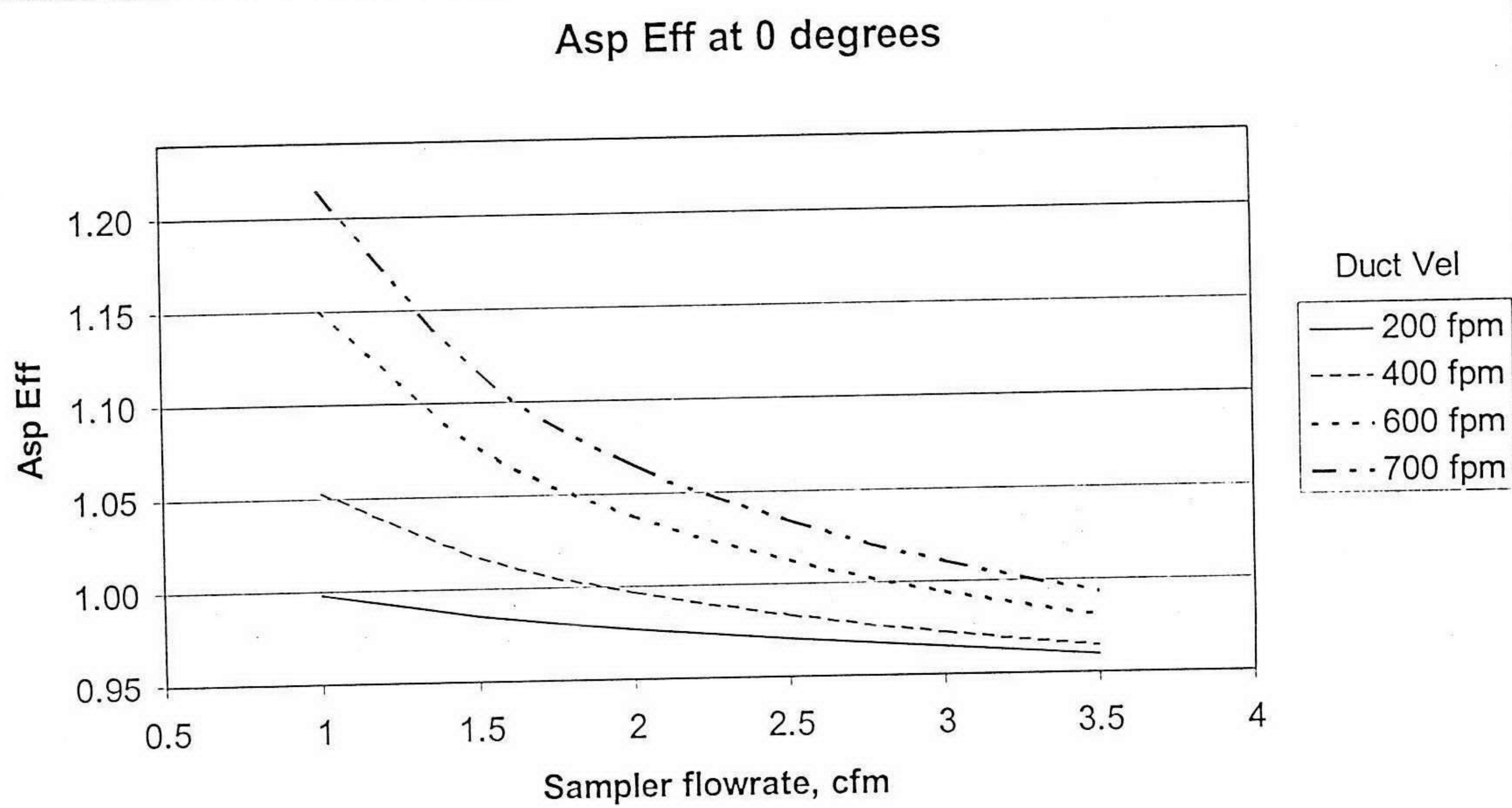
Asp Eff for 0.93-in nozzle at 45°



Asp Eff for 0.93-in nozzle at 22.5°



Asp Eff for 0.93-in nozzle at 0°



Conclusions for 0.93-in nozzle

- The aspiration efficiency is in a tight range for angles up to 67.5° and becomes more variable for larger angles and would require more attention to sample flow
- The aspiration efficiency should be between 0.8 and 1.05 for flowrates above 3 cfm
- The probe penetration should be around 83% with a tube size = 0.93" and flowrate 3 cfm for yaw angles from 0° – 90°

Calculating Sampling Aspiration Efficiency for PUREX HEPA Filter Housings to Estimate Potential Impact of Off-Axis Sampling

John Glissmeyer
PNNL
March 23, 2004

The equations used have been shown to apply to the particular conditions where there is the potential for sampling aerosol with a nozzle not aligned axially with the direction of the air velocity. Hangal and Willeke (1990) performed experiments on anisoaxial sampling, where the nozzle axis is misaligned with the direction of flow. Their data were taken in horizontal free-stream flow, with the nozzle inclined upward or downward with respect to the horizontal. They found certain correlations to fit their data.

Those correlations use the dimensionless Stokes number. The Stokes number is the ratio of the stopping distance to a characteristic dimension, *d*. The parameter *d* corresponds to the dimension of the object through which the particles pass, in this case the nozzle inlet diameter. The stopping distance is the distance in which a moving particle would come to rest in still air. The Stokes number is:

$$Stk = \frac{\rho_p d_p^2 U_o C_c}{9 \mu d} \qquad \text{Eq.1}$$

where:

ρ_p = particle density
d_p = particle diameter
U_o = particle velocity in the free stream
C_c = Cunningham slip correction factor
μ = gas viscosity
d = nozzle diameter

They found that the correlation of Durham and Lundgren (1980) for aspiration efficiency as a function of velocity ratio, sampling angle, and Stokes number fit their data for sampling angles from 0° - 60°. That correlation is:

$$\eta_{asp} = 1 + \left[(U_o/U)\cos\theta - 1\right]\left[\frac{1-\{1+[2+0.617(U/U_o)]Stk'\}^{-1}}{1-(1+2.617Stk')^{-1}}\right]\left[1-\{1+0.55Stk'\exp(0.25Stk')\}^{-1}\right] \qquad \text{Eq. 2}$$

where:

$Stk' = Stk \exp(0.022\theta)$

U = air velocity in the inlet
θ = angle between nozzle axis and velocity direction
and for $0.02 \leq Stk \leq 4$ and $0.5 \leq U_o/U \leq 2.0$

They also found that modifying the correlation of Laktionov (1973) fit their data for angles between 45° and 90°. That correlation is:

$$\eta_{asp} = 1 + \left[(U_o/U)\cos\theta - 1\right]\left[3Stk^{(U/U_o)^{0.5}}\right] \qquad \text{Eq. 3}$$

for $0.02 \leq Stk \leq 4$ and $0.5 \leq U_o/U \leq 2.0$

For the calculations to assess the impact of anisoaxial sampling in the PUREX HEPA filter housings, Equation 1 was used for angles up to 60 degrees, and equation 3 was used for angles greater than 60 degrees.

References

Durham, M. D. and D. A. Lundgren. 1980. *Evaluation of aerosol aspiration efficiency as a function of Stokes number, velocity ratio and nozzle angle.* Journal of Aerosol Science 11:179-178.

Hangal, S. and Willeke. 1990. *Overall efficiency of tubular inlets sampling at 0 – 90 degrees from horizontal aerosol flows.* Atmospheric Environment, 24A(9), pages 2379-2386.

Laktionov, A. B. 1973. *Aspiration of an aerosol into a vertical tube from a flow transverse to it.* Fizika Aerozoley 7:83-87 (Translation from Russian AD-760947, Foreign Technology Division, Wright-Patterson AFB, Dayton, OH).

Equations were as cited in:
Brockman, J. E. 1993. "Sampling and Transport of Aerosols." Chapter 6 in *Aerosol Measurement – Principles, Techniques and Applications*, K. Willeke and P.A. Baron, editors. Van Nostrand Reinhold, New York, NY.

ATTACHMENT 2

VELOCITY PROFILE MEASUREMENT PROCEDURE AND DATA

J7	Resolution/Retest 291-AE, PUREX Upstream Air Flow Test	CP-03-153/W WCN #1 Page 1 of 16

1.0 PURPOSE AND SCOPE

This procedure provides a safe, uniform method for obtaining PUREX duct pitot traverse velocity data. Measurements are obtained on a horizontal section of one HEPA housing, downstream of the deep bed prefilter, and immediately upstream of the operating HEPA filters located in building 291-AE, and the stack 291-A-1.

2.0 REFERENCES

None.

3.0 PERSONNEL REQUIREMENTS

3.1 Vent & Balance (VB) Power Operator and Lead.

3.2 Stationary Operating Engineer (SOE), as required.

3.3 Radiation Control Technician (RCT), as required.

3.4 Effluent Engineer, or representative, as required.

3.5 Nuclear Chemical Operator (NCO), as required

4.0 PRECAUTIONS AND LIMITATIONS

4.1 If during performance of this procedure, any of the following conditions are found, stop work, place equipment in a safe condition, and notify Person-In-Charge (PIC):

- Any equipment malfunction which could prevent fulfillment of its functional requirements.
- Personnel error or procedural inadequacy which could prevent fulfillment of procedural requirements.
- Limiting conditions of applicable RWP are exceeded.

4.2 Contact PIC or designee for additional instructions if changing plant conditions affect work or delays are anticipated to extend work past end of shift.

4.3 If any waste is generated during performance of this procedure, consult Facility Waste Coordinator for specific instructions to ensure compliance with PHMC and DOE environmental standards, as applicable, for disposal.

4.4 Take special care to ensure contamination control when inserting and withdrawing vent and balance equipment.

5.0 SPECIAL TOOLS, EQUIPMENT, AND MATERIALS

NOTE

All Measuring and Test Equipment (M&TE) used to perform this procedure must be within its current calibration cycle as shown on the calibration label.

5.1 Ventilation and Balance instrumentation and equipment including:

- Type-S pitot tube, with extension as needed.
- Starrett angle meter (or equivalent) for use in conjunction with Type-S pitot.
- Hot-wire anemometer, with extension as needed.
- Manometer or similar airflow equipment, calibrated.
- Hygrometer or other temperature and humidity measuring equipment, calibrated.
- Air source.
- Time piece.
- Calculator.
- Tape Measure.
- Metal foil duct tape, as needed.
- Duct tape, rags, etc. to temporarily block opening while performing traverse
- Personal Protective Clothing (as required)

6.0 PREREQUISITES

6.1 Potential for radiological contamination exists. Request RCT to perform appropriate survey(s) prior to beginning maintenance or removal of equipment or component from installed location.

6.2 The PUREX HVAC System is required to be operating in a standard configuration with no zone flow reductions as established by Stationary Operating Engineer.

7.0 INSTRUCTIONS

7.1 Complete Preliminary Actions for Testing Air Flow

7.1.1 ENSURE Pre-requisite conditions of this procedure have been met.

7.1.2 PREPARE equipment for test.

7.1.3 RECORD equipment calibration data (Data Sheet 1).

7.1.4 IF additional or replacement instrument(s) are used,
THEN RECORD calibration data AND EXPLAIN in COMMENTS section (Data Sheet 1).

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7.2 Obtain Barometric Pressure

7.2.1 CONTACT Hanford Weather Forecaster by telephone (373-2716).

7.2.2 REQUEST absolute barometric pressure (P_b) for closest weather station.

7.2.3 VERIFY location, station number, time and elevation.

7.2.4 RECORD data on Data Sheet 2.

7.3 IDENTIFY operating exhaust fan(s) data on Data Sheet 2.

7.4 Perform Pre-Test Leak Check

7.4.1 IF MP20 manometer is used,
THEN ENSURE Density Program is set to 0.000.

7.4.2 BLOW clean, dry air into pitot tube impact hole until manometer reads at least 3.00" w.g.

7.4.3 CLOSE off hole opening AND HOLD for minimum of 15 seconds.

NOTE
Leak check PASSES if manometer reading remains stable (± 0.2" w.g.) for at least 15 seconds; otherwise, leak check FAILS.

7.4.4 OBSERVE manometer reading AND RECORD results of impact side on Data Sheet 2.

7.4.5 APPLY suction to pitot tube static pressure hole until manometer reads at least 3.00" w.g., AND HOLD for minimum of 15 seconds.

7.4.6 OBSERVE manometer reading AND RECORD results of static side on Data Sheet 2.

7.4.7 RECORD PASS/FAIL results on Data Sheet 2.

7.4.8 IF leak check fails,
THEN:

7.4.8.1 REPAIR OR REPLACE equipment as required.

7.4.8.2 REPEAT Steps 7.4.2 through 7.4.8.

7.5 Identify Velocity Traverse Site

7.5.1 LOCATE velocity traverse site. See Figure 1.

7.6 Obtain Pitot Traverse Measurements

NOTE

- The velocity traverse site is at the HEPA housing immediately in front of the first stage of HEPA filters. The 24" X 24" HEPA filters are 3 wide by 4 high, in a 76" x 116" housing. The test points are located at the centers of each of the 12 filters, at 15", 39" and 63", as measured horizontally from the inside of the housing.
- The housing is 12 gage, 0.105" thick.
- There are four 4" ports, reduced to a 1" access.

7.6.1 Pitot Tube and Temperature Probe

7.6.1.1 MEASURE external port length, add housing thickness (0.105") and RECORD as port length on Data Sheet 3.

7.6.1.2 ADD port length to insertion depths indicated on Data Sheet 3 to determine probe insertion positions.

7.6.1.3 MARK pitot tube and temperature probe and hotwire anemometer insertion positions to allow accurate probe positioning during testing.

7.6.2 MEASURE relative humidity (RH) in stack air stream, AND RECORD on Data Sheet 3.

7.6.3 Stack Air Velocity Pressure, Null Angle and Temperature

NOTE

To measure the null angle, the Type S pitot tube must be positioned so the plane of the nozzle opening is parallel to the stream flow (i.e. sideways, in this case vertical). The null angle is measured as the angle of rotation from this position to obtain a zero (or minimum) differential pressure.

7.6.3.1 MEASURE null angle at each traverse point in order shown on Data Sheet 3 (obtained by rotating Type S pitot until VP is approximately 0, or lowest reading, then measuring angle of pitot from vertical.

7.6.3.2 MEASURE duct air temperature (t_s) at each traverse point in order shown on Data Sheet 3.

7.6.3.3 MEASURE velocity pressure (VP) with Type S pitot and velocity (FPM) with hotwire anemometer at each traverse point in order shown on Data Sheet 3.

7.6.3.4 WIPE pitot tube as it is removed, AND REQUEST RCT to perform removable contamination survey after withdrawing pitot tube from port.

7.6.4 REPEAT step 7.6.3 for remaining test port(s).

7.6.5 COMPLETE required information on Data Sheet 3.

7.7 Perform Post-test Leak Check

7.7.1 IF MP20 manometer is used,
THEN ENSURE Density Program is set to 0.000.

7.7.2 BLOW clean, dry air into pitot tube impact hole until manometer reads at least 3.00" w.g.

7.7.3 CLOSE off hole opening AND HOLD for minimum of 15 seconds.

NOTE
Leak check PASSES if manometer reading remains stable (± 0.2" w.g.) for at least 15 seconds; otherwise, leak check FAILS.

7.7.4 OBSERVE manometer reading and record results of impact side on Data Sheet 4.

7.7.5 APPLY suction to pitot tube static pressure hole until manometer reads at least 3.00" w.g., AND HOLD for minimum of 15 seconds.

7.7.6 OBSERVE manometer reading and record results of static side on Data Sheet 4.

7.7.7 RECORD PASS/FAIL results on Data Sheet 4.

7.7.8 IF either leak check fails,
THEN REPAIR OR REPLACE equipment as required AND:

7.7.8.1 REPEAT Steps 7.4.1 through 7.4.8.

7.7.8.2 REPEAT Steps 7.6.1 through 7.7.8.

7.8 Measure Static Air Pressure With Type S Pitot Tube

7.8.1 DISCONNECT tubing from total pressure side of pitot tube where it leaves static pressure side connected to manometer.

7.8.2 LEAVE loose tubing outside of duct.

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NOTE

Type S pitot tube must be positioned so the plane of the nozzle openings are parallel to the stream flow (i.e. facing sideways or tangent to the flow) or as designated by the effluent engineer.

7.8.3 INSERT pitot tube to near center of duct positioned so plane of nozzle opening is parallel to stream flow to measure relative duct static pressure.

7.8.4 READ static pressure (P_g) relative to ambient pressure on manometer AND RECORD results on Data Sheet 3.

7.9 Removing Test Equipment and Restoring Air System to Operating Configuration

NOTE

- Test Port covers may include caps, plugs, or new metal tape.
- "New" metal foil tape is the ONLY tape authorized for covering test port openings. Use of alternate tape or re-application of used metal tape is not allowed.

7.9.1 ENSURE all test ports are covered, using caps, plugs, or new metal tape, as required.

7.9.2 SURVEY all equipment before removal from work area, as required.

7.10 COMPLETE the following Duct Air Flow Test calculations, AND RECORD results on Data Sheet 4:

7.10.1 DETERMINE Total t_s by adding t_s entries on Data Sheet 3.

7.10.2 DETERMINE Average t_s by dividing Total t_s by number of t_s entries.

7.10.3 CALCULATE Velocity FPM for each traverse point based on values listed on Data Sheet 4 (note the use of Type S pitot correction factor, C_p = 0.84):

$$FPM = 4005\ (0.84)\ \sqrt{VP}$$

7.10.4 DETERMINE Total FPM by adding FPM entries on Data Sheet 3.

7.10.5 DETERMINE Average FPM by dividing Total FPM by number of FPM entries.

7.10.6 CALCULATE Total CFM to determine stack air flow on Data Sheet 4:

TOTAL CFM = AVERAGE FPM x DUCT AREA SQ FT

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8.0 RESTORATION

8.1 Ensure all equipment has been disconnected, removed and equipment staged for restoration to original condition.

8.2 Verify port plugs replaced with metal tape, as needed.

9.0 TESTING AND ACCEPTANCE

9.1 Note any off-standard conditions or discrepancies under COMMENTS on the attached Data Sheets.

9.2 Air flow test results acceptance is determined by the effluent engineer.

10.0 DISPOSITION

10.1 Inform Maintenance and Operations Management maintenance is complete.

10.2 Facility PIC shall ensure all caps, plugs, and instrumentation are restored to original configuration. If metal tape was used, then PIC shall ensure new metal tape is used. PIC print name, sign, and date Data Sheet 6.

10.3 Vent & Balance Reviewer ensure Data Sheets are complete, accurate, and legible.

10.4 Vent & Balance Reviewer print name, sign, and date Data Sheet 6.

10.5 Record Work Request Number(s) of any applicable work documents generated as a result of this instruction on Data Sheet 6.

10.6 Return Work Package to Work Control for proper distribution of Work Package and Post Review activities.

10.7 Forward work package to Effluent Engineer for completion of required calculations and data analysis. See Data Sheet 5.

10.8 When calculations are complete, Effluent Engineer signs and dates Data Sheets 5 and 6.

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11.0 BIBLIOGRAPHY

- HANFORD WEB, Intranet Resource Center, Policies and Procedures:
  - HNF-PRO-081, "Hazardous Energy Control Program,"
  - HNF-PRO-083, "Personal Protection,"
  - HNF-PRO-088, "Electrical Work Safety,"
  - HNF-PRO-072, "Plant Instrument and Equipment Status labeling."
- HSRCM-1, Hanford Site Radiological Control Manual, Chapter 2, Part 3, "Posting," and Chapter 3, Part 2, "Work Preparation."
- HNF-RD-8703, "Air Quality - Radioactive Emissions."
- 40 CFR 60, Appendix A, "Test Methods," Methods 1, 1A, 2 and 2C.
- 40 CFR 61, Subpart H.
- WAC 246-247 and Radioactive Air emissions permit FF01.
- HANFORD SITE AIR OPERATING PERMIT #00-05-006.
- DOE/EH-0173T, ENVIRONMENTAL REGULATORY GUIDE.
- 7-GN-166, "Stack Air Flow Test."
- HNF-5173, "Project Hanfod Radiological Control Manual."
- HNF-RD-7769, "OSHA Compliance."
- HNF-RD-8635, "Review of Technical Documents."

12.0 ATTACHMENTS

FIGURE 1 – TEST PORT LOCATION
DATA SHEET 1 - CALIBRATION DATA FOR 291-A-1
DATA SHEET 2 - BACKGROUND DATA FOR 291-A-1
DATA SHEET 3 - FLOW MEASUREMENTS FOR 291-A-1
DATA SHEET 4 - DATA COMPLETION FOR 291-A-1
DATA SHEET 5 - CALCULATIONS DATA FOR 291-A-1 (Sheet 1 of 2)
DATA SHEET 5 - CALCULATIONS DATA FOR 291-A-1 (Sheet 2 of 2)
DATA SHEET 6 - DISPOSITION DATA FOR 291-A-1

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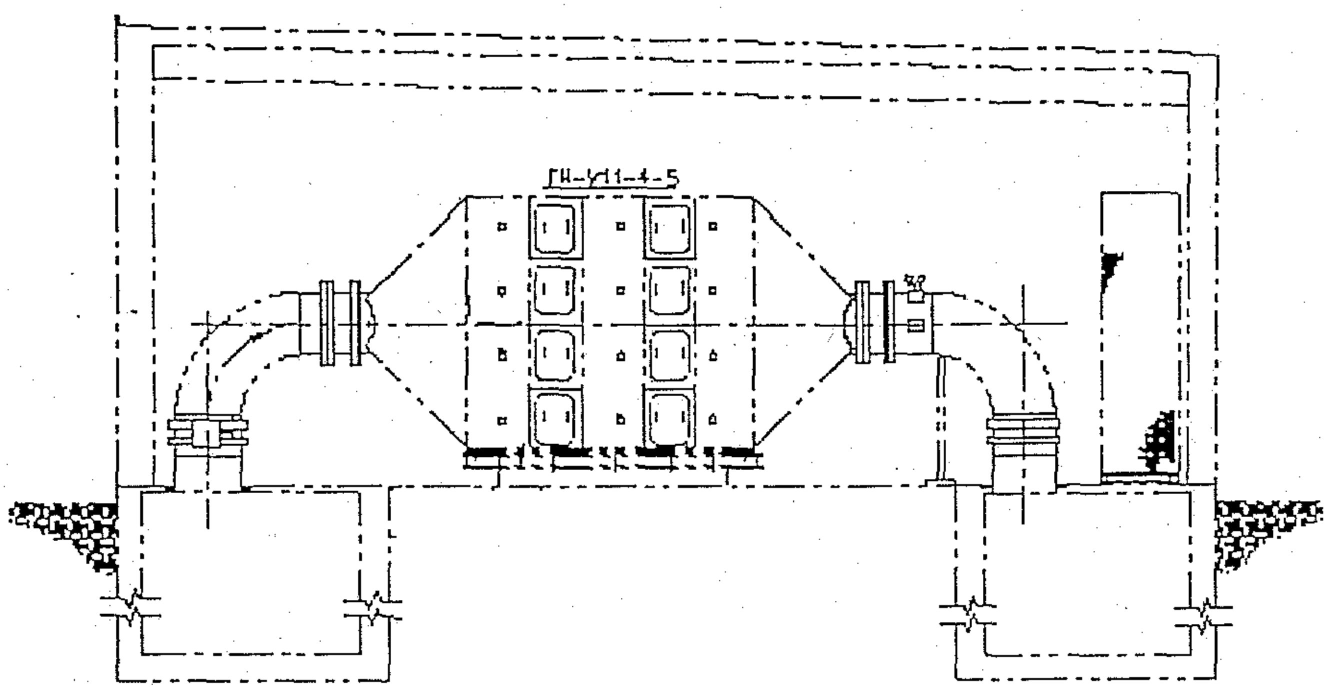
FIGURE 1
TEST PORT LOCATION



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DATA SHEET 1 - CALIBRATION DATA FOR 291-A-1

STEP #	INSTRUMENT CALIBRATION DATA	
7.1.3	AIR FLOW INSTRUMENT	HYGROMETER OR OTHER TEMPERATURE AND HUMIDITY MEASURING EQUIPMENT
	Flow Instrument Type Micro	Equipment Number Alnor
	HSL Code Number 702-28-09-018	HSL Code Number 799-28-01-012
	HSL Cal Due Date 12-20-03	HSL Cal Due Date 6-5-04
7.1.4	ADDITIONAL INSTRUMENT CALIBRATION DATA	
	Flow Instrument Type Alnor	
	HSL Code Number 799-28-01-012	
	HSL Cal Due Date 6-5-04	
	COMMENTS:	

Au / 11-14-03
Initials / Date

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DATA SHEET 2 - BACKGROUND DATA FOR 291-A-1

STEP #	BAROMETRIC PRESSURE READING				
7.2.1	Hanford Weather Forecaster (373-2716)				
7.2.4	Location	Station Number	Elevation (ft)	Time of Reading	Barometric Pressure (in. Hg)
		6	680	0930	29.356 (P_b)
	COMMENTS:				

STEP #			
7.3	Operating exhaust fan(s):	EF-V11-1	
7.4	PRE-TEST LEAK CHECK		
7.4.4 7.4.6 7.4.7	[Reading ≥ 3.0 in. wg and stable (± 0.2 in. wg) for 15 sec.] (7.4.4) Impact Pressure 3.13" wc (7.4.6) Static Pressure 3.08" wc		PASS/FAIL
	COMMENTS:		

Arc 11-14-03
Initials / Date

THINK ALARA IN ALL WE DO

DATA SHEET 3 - FLOW MEASUREMENTS

STEP #	AIR FLOW MEASUREMENTS, 291-A-1
7.6.1	Port length 3'' inches (external length plus wall thickness) added to traverse points.
7.6.2	Relative Humidity: 26 % %(RH)
7.8.4	Static Pressure: -1.44 "w.g. " w.g. (P_g)

STEP #	Traverse Point No.	Distance from inside duct wall (inches)	Port 1 (top) Type S pitot (Null Counterclockwise) Null Angle (°)	t_s (°F)	VP ("wg)	FPM* (ft/min)	Hotwire Anemometer FPM (ft/min)	Port 2 Type S pitot (Null Clockwise) Null Angle (°)	t_s (°F)	VP ("wg)	FPM* (ft/min)	Hotwire Anemometer FPM (ft/min)
7.6.3 7.6.4 7.6.5	1	15	30°	60°F	.003	~~225~~ 219 11-14-03	225	* 25° ↑	60°F	.004	253	200
	2	39	0° ↓	60°F	0	0	150	0° ↓	60°F	0	0	200
	3	63	40°	60°F	.060	981	720	0° ↓	60°F	0	0	210
					Total FPM:					Total FPM:		

	Traverse Point No.	Distance from inside duct wall (inches)	Port 3 (Null Counter Clockwise) Null Angle (°)	t_s (°F)	VP ("wg)	FPM* (ft/min)	Hotwire Anemometer FPM (ft/min)	Port 4 (bottom) (Null Clockwise) Null Angle (°)	t_s (°F)	VP ("wg)	FPM* (ft/min)	Hotwire Anemometer FPM (ft/min)
	1	15	30°	60°F	~~.004~~ .005 11-14	~~490~~ 237 11-14-03	190	20°	60°F	.013	457	325
	2	39	0°	60°F	~~.009~~ .00[illegible] 11-14	~~190~~ 163 11-14-03	190	0°	60°F	.006	310	275
	3	63	0°	60°F	0	~~210~~ 0	~~210~~ 0 ①	60°	60°F	.053	922	600
					Total FPM: 11-14-03	11-14-03				Total FPM:		

* FPM = $4005\ C_p \sqrt{VP} = 4005\ (0.84) \sqrt{VP} = 3364.2 \sqrt{VP}$

① Still used in calculations

* Stable No. 3.
↓ Flow down
↑ Flow up

Time test completed: ________

11-14-03
Initials/Date

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DATA SHEET 4 - DATA COMPLETION FOR 291-A-1

7.7	POST-TEST PRESSURE LEAK CHECK	
7.7.4 7.7.6 7.7.7	[Reading ≥ 3.0 in. wg and stable (± 0.2 in. wg) for 15 sec.] (7.7.4) Impact Pressure 4.30" wg (7.7.6) Static Pressure 4.10" wg	PASS/FAIL
	COMMENTS:	

	AIR FLOW CALCULATIONS		
7.10.1	Total $t_s = t_{s1} + t_{s2} + t_{s3} + \ldots$	Total t_s	(Sht 3) 720
7.10.2	Average t_s = Total $t_s \div 12$	t_s (avg)	60
7.10.3	Velocity $FPM = 4005(0.84)\sqrt{VP}$	Data Sheet 3	
7.10.4	Total FPM = $FPM_1 + FPM_2 + FPM_3 + \ldots$	Total FPM	(Sht 3) 3476 Alnor 3606 pitot
7.10.5	Average FPM = Total FPM ÷ 12	FPM (avg)	290 Alnor 301 pitot
7.10.6	Flow Rate (cfm) =FPM(avg) x duct area =FPM(avg) x 61.22 ft^2	cfm (total)	17754 Alnor 18427 pitot

[signature] / 11-14-03
Initials / Date

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ATTACHMENT 3

SAMPLING PROCEDURE, INSPECTION REPORTS AND CHAIN-OF-CUSTODY

J-4	RESOLUTION/RETEST PUREX UPSTREAM AIR SAMPLING	CP-03-152 /W PAGE 1 OF 13

1.0 SCOPE

1.1 Air sampling will be performed upstream of the exhaust HEPA filters to provide information that will be used to accurately verify PUREX stack unabated emissions potential. This will involve the following activities, by section:

6.1 FABRICATION OF SAMPLE PROBE
6.2 ASSEMBLY OF SAMPLING INSTRUMENT CABINET
6.3 SAMPLE FILTER PREPARATION AND INITIAL DOCUMENTATION
6.4 INSTALLATION AND LEAK TEST OF SAMPLING EQUIPMENT
6.5 OPERATION OF SAMPLER
6.6 SAMPLING SYSTEM INSPECTION, FILTER REPLACEMENT, AND PROBE REPOSITIONING
6.7 FINAL SAMPLE AND PROBE REMOVAL FOR LABORATORY ANALYSIS
6.8 RESTORATION

Sampling will be performed for one day each at 12 positions, corresponding to each of the 12 HEPA filter faces; 3 positions along each of 4 traverses. Each sample position must be sampled for approximately the same time. Sample filters must be replaced as required to maintain adequate sample flow rate. The sample probe must not be left in the duct when not sampling for extended periods. Section 6.6 of this procedure is to be used repeatedly for the daily system inspections, filter replacements (as needed), and daily probe repositioning. Additional Sampling System Inspection Report sheets and COCs may be added as needed. Steps may be repeated as necessary to obtain the required samples, as determined by the effluent engineer. Sample duration will be designated by the effluent engineer. Sample flow rate may be re-designated by the effluent engineer.

2.0 SPECIAL TOOLS, EQUIPMENT, AND MATERIALS

- Calibrated rotameter, 40-400 scfh.
- Calibrated vacuum gage, 0-30" Hg
- Sample filter holders, flow control valve, vacuum pump, sample cabinet, miscellaneous pipe, tubing, hose, fittings, as required.
- Black ink pen
- Sample envelopes
- Plastic bag(s)
- Versapore 3000 Filter Papers (TN, or equivalent)
- Silver Zeolite cartridge, Hi-Q AGX-2 or equivalent

3.0 REFERENCES

3.1 Engineering Sketch (ES-CP-03-00152-1 Sh1, Rev. 3)

3.2 Attachment 1 – Sample Probe Positions

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3.3 Attachment 2 - Pressure Correction Chart

3.4 Attachment 3 – Sampling System Inspection Report

3.5 Attachment 4 – PUREX Upstream Air Sample Chain-of-Custody

4.0 PRECAUTIONS/LIMITATIONS

4.1 Observe the appropriate RWP and plant area entry requirements.

4.2 If during performance of this procedure, any of the following conditions are found, stop work, place equipment in a safe condition, and notify Effluent Engineer and Radiological Control Supervisor:

- Any equipment malfunction that could prevent fulfillment of its functional requirements.
- Personnel error or procedural inadequacy that could prevent fulfillment of procedural requirements.

4.3 In the event of an emergency, call 911, then the Facility Point-of-Contact at 528-1350.

4.4 Sampler is required to be inspected daily, probe repositioned daily, and flow adjusted daily. Notify Effluent Engineer of problems.

4.5 The contaminated duct is under negative pressure, so it draws in air when opened for confinement of radionuclides. Utilize the same radiological control measures as routinely performed during aerosol and air flow tests. An RWP will be required for this work. Re-use or replace port caps as required by Radiological Control. Glove and equipment surveys will be performed each time potentially contaminated equipment is removed, opened, or handled.

5.0 PREREQUISITES

5.1 Ensure that the rotameter and vacuum gage have been calibrated prior to installation. Ensure copies of calibration certification and data sheets are included in the work package.

5.2 Personnel Requirements

- RCT support is required throughout to ensure radiological control, and nuclear operators as required. Pipe Fitter required for fabrication, assembly, installation, repeated probe positioning, removal, and restoration. Sample filter preparation, filter replacements, sampler operating adjustments, and inspections are performed by an RCT.

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6.0 INSTRUCTIONS

NOTE:
Section 6.6 of this procedure is to be used repeatedly for the system inspections, filter replacements (as needed), and probe repositioning. Additional Sampling System Inspection Report sheets and COCs may be added as needed. Fabrication, assembly and preparation steps (6.1 – 6.3) may be performed in parallel. Perform fabrication and assembly steps only as needed, re-using the system assembled for B-Plant sampling, as available. Steps may be repeated as necessary to obtain the required samples, as determined by the effluent engineer. Work steps may be performed in parallel, out of sequence, or repeated as appropriate to assist with efficient implementation of this multi-craft effort, when authorized by the PIC and Effluent Engineer/Design Authority. Record any comments in the craft log.

6.1 FABRICATION OF SAMPLE PROBE

6.1.1 Fabricate air sample probe according to engineering sketch. Ensure a 5-diameter radius bend, as measured from center of tubing. Sharpen exterior nozzle tip.

6.1.2 Fabricate/assemble probe mountings according to engineering sketch. Set collar to indicate probe nozzle orientation.

6.2 ASSEMBLY OF SAMPLING INSTRUMENT CABINET

6.2.1 Assemble a vacuum gage, rotameter, flow control valve, vacuum pump, pipe/tube/hose and fittings into sampling cabinet according to engineering sketch layout. Install suction and exhaust hoses, fittings, and sample filter holders.

6.3 SAMPLE FILTER PREPARATION AND INITIAL DOCUMENTATION

6.3.1 Prepare air sample filter Versapore 3000 and silver zeolite cartridge using the following Numbering system.

SAMPLE NUMBER DESIGNATION	
Sample Point Identification:	291-A-1 Upstream
Sample Number:	1A, 1B, 1C... (primary filter), 2 (secondary filter), 3 (silver zeolite cartridge)

6.3.2 Record sample point identification, sample number and "on" date on the outside edge of the sample filter and on the side of the silver zeolite cartridge.

6.3.3 Ensure air sample envelopes are labeled with following information:

- Sample Point Identification (i.e. 291-A-1 Upstream)
- Sample Number
- Sample "on" date

6.3.4 Ensure current date is recorded on the Sampling System Inspection Report (Attachment 3).

6.3.5 Ensure rotameter <u>and</u> vacuum gage identifications and calibration expiration dates are correctly recorded on Inspection Report, and expected flow rate (3.0 scfm, or as directed by effluent engineer).

6.4 INSTALLATION AND LEAK TEST OF SAMPLING EQUIPMENT

6.4.1 Place sampling instrument cabinet near the intended sampling location, as identified in engineering sketch. Ensure the flow control valve is shut.

6.4.2 Remove cap from the 1/2" port, place in bag for storage and re-use, and install exhaust hose onto duct, as identified in engineering sketch.

6.4.3 Insert labeled sample media into sample holders.

6.4.3.1 Ensure sample filter support screen is in place, and check condition of o-ring on combination sample holder.

6.4.3.2 Place new, labeled, air sample media in sample holders. Ensure silver zeolite cartridge is positioned with airflow arrow pointing in the direction of air flow.

6.4.3.3 Close and ensure all components of sample holders are hand-tight.

6.4.4 Attach sample probe to sampling system.

6.4.5 Leak test system:

6.4.5.1 Ensure all connections are tight, with exception of probe mount slide connection.

6.4.5.2 Open flow control valve, start pump, block probe nozzle, and verify flow rate drops to zero on rotameter.

6.4.5.3 Repeat these steps until system passes leak test.

6.4.5.4 Stop pump and shut flow control valve.

6.4.6 Remove cap from the top 4" port for sample probe installation, as identified in engineering sketch, and place in bag for storage and re-use.

6.4.7 Clean any debris from port.

NOTE:
To ensure a representative sample, it is important to avoid scraping the probe nozzle on any potentially contaminated internal duct or port surfaces.

6.4.8 Install sample probe into duct:

6.4.8.1 Carefully insert probe into port to the 1st sampling position (15" inside duct, see Attachment 1), with nozzle facing upstream, away from the HEPA face, verifying orientation with the shaft collar. Ensure nozzle tip does not scrape any port or duct surfaces, to prevent sample contamination.

6.4.8.2 Tighten the probe mount slide connection. Provide external probe/hose support as required.

6.5 OPERATION OF SAMPLER

6.5.1 Perform general sampler system check:

6.5.1.1 Inspect for proper configuration, no loose, or damaged components.

6.5.1.2 Check rotameter tube, <u>and</u> float for debris (e.g., oil, dirt, <u>or</u> foreign matter).

6.5.1.3 Record results of system check on Inspection Report. Document problems in "Comments" section.

6.5.2 Open flow control valve.

6.5.3 Start vacuum pump.

6.5.4 Using vacuum gage and Attachment 2 (Pressure Correction Chart), adjust sample flow control valve to obtain the desired rotameter indication for the required sample flow rate of 3.0 scfm, or as designated by the effluent engineer.

6.5.5 Obtain initial readings for sampler operation at the 1st probe position: Record start time, initial rotameter and vacuum gage readings and actual flow rate (as determined from the Pressure Correction Chart, Attachment 2) on Inspection Report and sample envelopes.

6.6 SAMPLING SYSTEM INSPECTION, FILTER REPLACEMENT, AND PROBE REPOSITIONING

6.6.1 Obtain final readings at the current probe position: Record date, time, final readings from rotameter <u>and</u> vacuum gage, actual flow (as determined from the Pressure Correction Chart, Attachment 2), and RCT initials/HID# on the Inspection Report.

6.6.2 Replace filter, as required. If flow has dropped more than 0.1 scfm from the previous days' flow, contact the effluent engineer (Dan Johnson, 373-4209, pager 85-3643) to determine whether the filter needs to be changed.

6.6.2.1 Prepare replacement sample filter and envelope per step 6.3, and record new primary sample # (1B, 1C, 1D...etc.) on Inspection Report.
6.6.2.2 Remove primary air sample filter from first sample holder, take a direct survey measurement, place filter in a pitri dish, then in an air sample envelope. Record the sample # and survey reading in the comments section of the Inspection Report.
6.6.2.3 Record "off" rotameter and vacuum readings and actual flow on sample envelope.
6.6.2.4 Record date/time "off" on sample envelope.
6.6.2.5 Record signature and Payroll Number on envelope.
6.6.2.6 Insert labeled sample filter into sample holder.
6.6.2.7 Close and ensure all components of sample holder is hand-tight.

6.6.3 Reposition probe to the next position according to the sequence indicated in Attachment 1.

6.6.3.1 For next positions 2, 3, 5, 6, 8, 9, 11 and 12, loosen the probe fitting, and slide the probe in 24" to the next position.
6.6.3.2 For next positions 4, 7 and 10, remove probe, and re-install at the next port, as follows:

6.6.3.2.1 Shut off vacuum pump and close flow control valve.

6.6.3.2.2 Remove cap from next port.

6.6.3.2.3 Carefully remove probe from port, ensuring nozzle tip does not contact the inner duct or port surfaces, to prevent contamination of sample. Remove probe by pulling it through a damp cloth to remove any external contamination, and enclose in plastic sleeve. (If the probe is to be stored for a period before it is re-inserted, contact Effluent Engineer for direction. Restore operation upon re-insertion.)

6.6.3.2.4 Insert probe into next port, 15" into the duct.

6.6.3.2.5 Cap previous port.

6.6.4 Perform general sampler system check:

6.6.4.1 Inspect for proper configuration, no loose, or damaged components.

6.6.4.2 Check rotameter tube, <u>and</u> float for debris (e.g., oil, dirt, <u>or</u> foreign matter).

6.6.4.3 Record results of system check on Inspection Report. Document problems in "Comments" section.

6.6.5 Perform flow rate adjustments as needed:

6.6.5.1 Re-start vacuum pump and open flow control valve, if shut off previously for probe removal.

6.6.5.2 Compare actual flow to Expected Flow Rate.

6.6.5.3 Adjust flow control valve to achieve Expected Flow Rate.

6.6.5.4 If unable to achieve desired flow rate, then document problems in "Comments" section of Inspection Report, continue inspection and notify effluent engineer.

6.6.6 Obtain initial readings for the new probe position: Record the date, time, initial rotameter and vacuum gage readings, and actual flow as determined from Pressure Correction Chart (Attachment 2) for the new sampling position on the Inspection Report.

6.7 FINAL SAMPLE AND PROBE REMOVAL FOR LABORATORY ANALYSIS

6.7.1 Obtain final readings for the last (12th) probe position. Record date, time, final readings from rotameter <u>and</u> vacuum gage, actual flow (as determined from the Pressure Correction Chart, Attachment 2), and RCT initials/HID# on the Inspection Report.

6.7.2 Remove primary air sample filter from first sample holder, take a direct survey measurement, place filter in a pitri dish, then in an air sample envelope. Record the sample # and survey reading in the comments section of the Inspection Report.

6.7.3 Remove secondary air sample filter from second sample holder, take a direct survey measurement, and then place in air sample envelope. Record the survey reading in the comments section of the Inspection Report. (Note: The secondary filter provides assurance that the downstream sampling equipment has not been contaminated by the sampling).

6.7.4 Remove silver zeolite cartridge, place in a plastic bag, and then place in air sample envelope.

6.7.5 Shut off vacuum pump and close flow control valve.

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6.7.6 Carefully remove probe from port, ensuring nozzle tip does not contact the inner duct or port surfaces, to prevent contamination of sample. Remove probe by pulling it through a damp cloth to remove any external contamination, and enclose in plastic sleeve. Plug probe nozzle with tape to contain contamination.

6.7.7 Cap sample port.

6.7.8 Disconnect between primary and secondary sample holders, leaving the probe and primary sample holder intact.

6.7.9 Cut probe into ~2' sections, or as directed by effluent engineer (for laboratory handling).

6.7.10 Disconnect sampling system exhaust from port. (Remove the fitting from sampling exhaust system, and store separately if contaminated, or per RadCon direction, to ensure equipment is releasable for use elsewhere). Store all components for future re-use.

6.7.11 Cap exhaust port.

6.7.12 Record "off" rotameter and vacuum readings and actual flow on sample envelopes.

6.7.13 Record date/time "off" on sample envelopes.

6.7.14 Record signature and Payroll Number on envelopes.

6.7.15 Fill out COC form as follows:

- Dates and Times on
- Dates and Times off
- On Flow Rates (actual flow)
- Off Flow Rates (actual flow)
- Comments

6.7.16 Sign <u>and</u> enter HID on the COC form at the "Sample Collected By" line.

6.7.17 Perform survey of sample containers for shipment.

6.7.18 Package probe and samples for shipping to the laboratory. Consult S&M Waste Specialist for packaging and shipping instructions.

6.7.19 Contact effluent engineer to determine the appropriate laboratory (WSCF or 222-S).

6.7.20 Transport samples to the laboratory.

6.7.21 Obtain copy of COC form, documenting laboratory receipt, and place copy in the work package.

6.8 RESTORATION

6.8.1 Relocate sampling system, as required.

6.8.2 Clean up any construction debris associated with the job and properly dispose in the appropriate waste receptacle. Contact waste management personnel for guidance as required.

7.0 <u>RETEST</u>

7.1 Repeat steps as necessary to obtain the required samples, as determined by the Effluent Engineer. Additional Sampling System Inspection Report sheets and COCs may be added, as needed. Record any comments in the craft log.

ATTACHMENT 1

SAMPLE PROBE POSITIONS

Cross-section layout of the 3-wide by 4-high HEPA bank. The sampling points are positioned upstream of the centers of HEPA filters. The sample points are numbered from the perspective of the filters, facing upstream.

15"	39"	63"
1	2	3
4	5	6
7	8	9
10	11	12

ATTACHMENT 2

PRESSURE CORRECTION CHART FOR DWYER 40 TO 400 SCFH ROTAMETER
CALIBRATED AT STANDARD CONDITIONS * WITH ACTUAL FLOW IN UNITS OF SCFM

FLOW READING (SCFH)	INDICATED VACUUM ON GAUGE (INCHES Hg)														
	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
150	2.3	2.2	2.2	2.1	2.1	2.0	2.0	1.9	1.9	1.8	1.8	1.7	1.6	1.6	1.5
155	2.4	2.3	2.3	2.2	2.2	2.1	2.1	2.0	1.9	1.9	1.8	1.8	1.7	1.6	1.6
160	2.4	2.4	2.3	2.3	2.2	2.2	2.1	2.1	2.0	1.9	1.9	1.8	1.8	1.7	1.6
165	2.5	2.5	2.4	2.4	2.3	2.2	2.2	2.1	2.1	2.0	1.9	1.9	1.8	1.7	1.7
170	2.6	2.5	2.5	2.4	2.4	2.3	2.3	2.2	2.1	2.1	2.0	1.9	1.9	1.8	1.7
175	2.7	2.6	2.6	2.5	2.4	2.4	2.3	2.3	2.2	2.1	2.1	2.0	1.9	1.8	1.8
180	2.7	2.7	2.6	2.6	2.5	2.4	2.4	2.3	2.3	2.2	2.1	2.0	2.0	1.9	1.8
185	2.8	2.8	2.7	2.6	2.6	2.5	2.5	2.4	2.3	2.2	2.2	2.1	2.0	1.9	1.9
190	2.9	2.8	2.8	2.7	2.6	2.6	2.5	2.5	2.4	2.3	2.2	2.2	2.1	2.0	1.9
195	3.0	2.9	2.8	2.8	2.7	2.7	2.6	2.5	2.4	2.4	2.3	2.2	2.1	2.1	2.0
200	3.0	3.0	2.9	2.9	2.8	2.7	2.7	2.6	2.5	2.4	2.4	2.3	2.2	2.1	2.0
205	3.1	3.1	3.0	2.9	2.9	2.8	2.7	2.6	2.6	2.5	2.4	2.3	2.2	2.2	2.1
210	3.2	3.1	3.1	3.0	2.9	2.9	2.8	2.7	2.6	2.6	2.5	2.4	2.3	2.2	2.1
215	3.3	3.2	3.1	3.1	3.0	2.9	2.8	2.8	2.7	2.6	2.5	2.4	2.4	2.3	2.2
220	3.3	3.3	3.2	3.1	3.1	3.0	2.9	2.8	2.8	2.7	2.6	2.5	2.4	2.3	2.2
225	3.4	3.4	3.3	3.2	3.1	3.1	3.0	2.9	2.8	2.7	2.6	2.6	2.5	2.4	2.3
230	3.5	3.4	3.4	3.3	3.2	3.1	3.0	3.0	2.9	2.8	2.7	2.6	2.5	2.4	2.3
235	3.6	3.5	3.4	3.4	3.3	3.2	3.1	3.0	2.9	2.9	2.8	2.7	2.6	2.5	2.4
240	3.7	3.6	3.5	3.4	3.3	3.3	3.2	3.1	3.0	2.9	2.8	2.7	2.6	2.5	2.4
245	3.7	3.7	3.6	3.5	3.4	3.3	3.2	3.2	3.1	3.0	2.9	2.8	2.7	2.6	2.5
250	3.8	3.7	3.6	3.6	3.5	3.4	3.3	3.2	3.1	3.0	2.9	2.8	2.7	2.6	2.5
255	3.9	3.8	3.7	3.6	3.6	3.5	3.4	3.3	3.2	3.1	3.0	2.9	2.8	2.7	2.6
260	4.0	3.9	3.8	3.7	3.6	3.5	3.4	3.4	3.3	3.2	3.1	3.0	2.8	2.7	2.6
265	4.0	3.9	3.9	3.8	3.7	3.6	3.5	3.4	3.3	3.2	3.1	3.0	2.9	2.8	2.7
270	4.1	4.0	3.9	3.9	3.8	3.7	3.6	3.5	3.4	3.3	3.2	3.1	3.0	2.8	2.7
275	4.2	4.1	4.0	3.9	3.8	3.7	3.6	3.5	3.4	3.3	3.2	3.1	3.0	2.9	2.8
280	4.3	4.2	4.1	4.0	3.9	3.8	3.7	3.6	3.5	3.4	3.3	3.2	3.1	2.9	2.8
285	4.3	4.2	4.2	4.1	4.0	3.9	3.8	3.7	3.6	3.5	3.4	3.2	3.1	3.0	2.9
290	4.4	4.3	4.2	4.1	4.0	3.9	3.8	3.7	3.6	3.5	3.4	3.3	3.2	3.1	2.9
295	4.5	4.4	4.3	4.2	4.1	4.0	3.9	3.8	3.7	3.6	3.5	3.4	3.2	3.1	3.0
300	4.6	4.5	4.4	4.3	4.2	4.1	4.0	3.9	3.8	3.6	3.5	3.4	3.3	3.2	3.0
305	4.6	4.5	4.4	4.4	4.3	4.1	4.0	3.9	3.8	3.7	3.6	3.5	3.3	3.2	3.1
310	4.7	4.6	4.5	4.4	4.3	4.2	4.1	4.0	3.9	3.8	3.6	3.5	3.4	3.3	3.1
315	4.8	4.7	4.6	4.5	4.4	4.3	4.2	4.1	3.9	3.8	3.7	3.6	3.4	3.3	3.2
320	4.9	4.8	4.7	4.6	4.5	4.4	4.2	4.1	4.0	3.9	3.8	3.6	3.5	3.4	3.2
325	4.9	4.8	4.7	4.6	4.5	4.4	4.3	4.2	4.1	4.0	3.8	3.7	3.6	3.4	3.3
330	5.0	4.9	4.8	4.7	4.6	4.5	4.4	4.3	4.1	4.0	3.9	3.8	3.6	3.5	3.3

* Standard Conditions: Pressure= 29.92 " Hg ; Temperature = 70 Degrees F.
Pressure Correction calculation from DWYER: Q2 = Q1/60*SQRT((29.92-P2)/29.92)

NOTE: Contact the Effluent Engineer for pressure corrections outside the ranges indicated above.

ATTACHMENT 3

SAMPLING SYSTEM INSPECTION REPORT

Sample Point ID	Rotameter ID	Rotameter Expiration	Vacuum Gage ID	Vacuum Gage Expiration	Expected Flow Rate
291-A-1 Upstream	776-28-03-002	9-2-04	PI-U19-22-1	09/04	3.0 SCFM

Sampling Position	Primary Sample #	Date	Time	Initial Rotameter Reading (cfh)	Initial Vacuum Reading ("Hg)	Initial Actual Flow (scfm)	Date	Time	Final Rotameter Reading (cfh)	Final Vacuum Reading ("Hg)	Final Actual Flow (scfm)	System Check		RCT Initial/HID #
1	1A	2/25/04	1015	200	5.0	3.0	2/26/04	0915	200	5.0	3.0	Sat	Unsat	0048468
2	1A	2/26/04	0920	200	5.0	3.0	2/27/04	0750	200	5.0	3.0	Sat	Unsat	0048468
3	1A	2/27/04	0735	200	5.0	3.0	2/28/04	0730	200	5.0	3.0	Sat	Unsat	0048468
4	1A	2/28/04	0800	200	5.0	3.0	2/29/04	0720	200	5.0	3.0	Sat	Unsat	0048468
5	1A	2/29/04	0725	200	5.0	3.0	3/1/04	0800	200	5.0	3.0	Sat	Unsat	0074227
6	1A	3/1/04	0800	200	5.0	3.0	3/2/04	0820	200	5.0	3.0	Sat	Unsat	0048468
7	1A	3/2/04	0855	200	5.0	3.0	3/3/04	0845	200	5.0	3.0	Sat	Unsat	0048468
8	1A	3/3/04	0850	200	5.0	3.0	3/4/04	0810	200	5.0	3.0	Sat	Unsat	0048468
9	1A	3/4/04	0811	200	5.0	3.0	3/5/04	0825	200	5.0	3.0	Sat	Unsat	0048468
10	1A	3/5/04	0900	200	5.0	3.0	3/6/04	0730	200	5.0	3.0	Sat	Unsat	0048468
11	1A	3/6/04	0735	200	5.0	3.0	3/7/04	0720	200	5.0	3.0	Sat	Unsat	0049599
12	1A	3/7/04	0725	200	5.0	3.0	3/8/04	1205	200	5.0	3.0	Sat	Unsat	0049599

Comments: INITIAL READINGS

1A - 3/8/04 140,000 d/m α 650,000 d/m βγ / 3-11-04 2100 d/m α 3000 d/m βγ

2 - 3/8/04 3,500 d/m α 20,000 d/m βγ / 3-11-04 140 d/m α 1000 d/m βγ

* READINGS ON SAMPLES LESS THAN BACKGROUND ON 3/15/04

ATTACHMENT 4

PUREX UPSTREAM AIR SAMPLE CHAIN-OF-CUSTODY

Company: FH
Company Contact: Dan Johnson, 373-4209

Analysis Request: Gross Alpha/Beta and GEA on each individually (primary, secondary, and probe rinses), then combine all for Sr-90, Pu isotopic, Am-241. Analyze silver zeolite cartridge for I-129.

Sample Number	Sample Point ID	On		Off		On Flow Rate (scfm)	Off Flow Rate (scfm)	Comments
		Date	Time	Date	Time			
1A	291-A-1 Upstream	2/25/04	1015	3/8/04	1205	3.0	3.0	Primary filter
1B	291-A-1 Upstream	N/A						Primary filter
1C	291-A-1 Upstream	N/A						Primary filter
1D	291-A-1 Upstream	N/A						Primary filter
1E	291-A-1 Upstream	N/A						Primary filter
1F	291-A-1 Upstream	N/A						Primary filter
2	291-A-1 Upstream	2/25/04	1015	3/8/04	1205	3.0	3.0	Secondary filter
3	291-A-1 Upstream	2/25/04	1015	3/8/04	1205	3.0	3.0	Silver Zeolite Catridge
Probe	291-A-1 Upstream	2/25/04	1015	3/8/04	1205	3.0	3.0	Decon probe and filter holder for re-use. Include this as part of the probe sample.

Sample Collected By: [signature] / 0048468
Signature HID#

Relinquished By: [signature] / 0048468 Date: 3/15/04 Time: 0835
Signature HID#

Received By: [signature] / H0064304 Date: 3/15/04 Time: 0835
Signature HID#

Relinquished By: ______ / ______ Date: ______ Time: ______
Signature HID#

Received By: ______ / ______ Date: ______ Time: ______
Signature HID#

Relinquished By: ______ / ______ Date: ______ Time: ______
Signature HID#

LABORATORY
FINAL SAMPLE DISPOSAL METHOD: ______ By: ______ Date: ______ Time: ______
Signature

ENERGY NORTHWEST
People · Vision · Solutions

Standards Laboratory

Plant Support Facility
MD 1025, PO Box 968
Richland, WA 99352-0968
Phone (509) 377-8603 FAX (509) 377-8219

Certificate of Calibration

Manufacturer: DWYER
Description: FLOWMETER
Report Number: 1062509711
Release Number:
Customer / MSIN: MCCOLLUM CR - WIPP-CP / R3-30

Model: RMC-104
Asset Number: 776-28-03-002
Serial Number: ~~N/A~~ 2A(C3) 85.5
Ref. Number: 03-01759
Building: 2620W

CALIBRATION INFORMATION

Test Conditions:

Receive Date: 2-Sep-03
Calibration Date: 2-Sep-03
Calibration Due: 2-Sep-04
Technician P. J. Rumbelow

Procedure / Rev: 24-33 Rev. 0.1
Temperature: 73.0 F
Humidity: 42 %

Test Results:

Pass: Y
Incomplete: N
Limited: N
As Found. PASS
As Left: PASS

Remarks:

STANDARDS USED FOR CALIBRATION

Asset Number	Manufacturer	Model	Description	Calibration Date	Due Date
0063116	OMEGA	UNKNOWN	NOZZLE TEMP MONITOR	5/1/2003	5/1/2004
0063060	OMEGA	UNKNOWN	UUT TEMP MONITOR	5/1/2003	5/1/2004
001-80-02-001	MENSOR	6010	NOZZLE PRESSURE X-DUCER 0-150 PSI	3/5/2003	3/5/2004
001-80-02-002	SETRA	270	UUT PRESSURE X-DUCER	3/5/2003	3/5/2004
001-28-06-002	COX INSTR. CO	0.044	SONIC FLOW NOZZLE	10/24/2001	10/24/2006
001-28-06-003	COX INSTR. CO.	0.062	SONIC FLOW NOZZLE	10/24/2001	10/24/2006
001-28-06-004	COX INSTR. CO.	0.088	SONIC FLOW NOZZLE	10/24/2001	10/24/2006
002-32-07-003	OMEGA	CT485B	HYGROTHERMOGRAPH	5/6/2003	5/6/2004

ORIGINAL

Notes/General Conditions:

The standards and calibration program of the Energy Northwest Standards Laboratory complies with the requirements of 10 CFR50 Appendix B and ANSI/NCSL Z-540-1.
Unless otherwise noted: The standards used in this calibration, described in the referenced calibration procedure with associated uncertainties or tolerances, are traceable to the National Institute of Standards and Technology (NIST). The total uncertainties or tolerances of the standards used are no greater than 25% of the tolerance of the unit tested. There are no special limitations of use imposed on this item.
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9/22/03

1 4

23-4757

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Standards Laboratory

Calibration Results Report

Report of Calibration Traceable to the National Institute of Standards and Technology (NIST)

Cal Code/ ID#	Manufacturer	Model	Serial No.
776-28-03-002	DWYER	RMC-104	~~N/A~~ 24003 9315
Procedure/Revision:	**Performed by:**	**Condition F/L:**	**Result:**
4-38 0	P. J. Rumbelow	FOUND-LEFT	PASS
Temperature	**Humidity:**	**Cal Date**	**Due Date:**
73.0 F	42 %	9/2/2003	9/2/2004

Remarks:

andards Used

set	Mfg	Model	Description	Cal. Date	Due Date
63116	OMEGA	UNKNOWN	NOZZLE TEMP MONITOR	5/1/2003	5/1/2004
63060	OMEGA	UNKNOWN	UUT TEMP MONITOR	5/1/2003	5/1/2004
1-80-02-001	MENSOR	6010	NOZZLE PRESSURE X-DUCER 0-150 PSI	3/5/2003	3/5/2004
1-80-02-002	SETRA	270	UUT PRESSURE X-DUCER	3/5/2003	3/5/2004
1-28-06-002	COX INSTR. CO.	0.044	SONIC FLOW NOZZLE	10/24/2001	10/24/2006
1-28-06-003	COX INSTR. CO.	0.062	SONIC FLOW NOZZLE	10/24/2001	10/24/2006
1-28-06-004	COX INSTR. CO.	0.088	SONIC FLOW NOZZLE	10/24/2001	10/24/2006
2-32-07-003	OMEGA	CT485B	HYGROTHERMOGRAPH	5/6/2003	5/6/2004

est Data

EST#	STD PARAMETER	TRUE VALUE	UNIT UNDER TEST READING	TOLERANCE	UUT ERROR	ERROR in (% of Tol)	TUR	NOTI USE
1	80.00_SCFHz	83.190	79.21	8_SCFH	-3.9828732	50		
2	160.00_SCFHz	161.010	158.41	8_SCFH	-2.595746_SCFHz	32		
3	240.00_SCFHz	238.992	237.62	8_SCFH	-1.370619_SCFHz	17		
4	320.00_SCFHz	315.684	316.83	8_SCFH	1.144507_SCFHz	14		
5	400.00_SCFHz	399.012	396.04	8_SCFH	-2.976366_SCFHz	37		

TURs < 4:1 are reported under TUR in the Test Data .

Verification Completed

End of Test Data

Reviewed By:	Date:	Tested By:	Date:
[signature]	9/2/03	Phyllis Rumbelow	9-2-03

Report Number: 1062309711
Model: RMC-104 Cal Code: 776-28-03-002 S/N: N/A
Calibrated on: 9/2/2003 at 13:35:11

ORIGINAL

Page 2 of 4

J-4	RESOLUTION/RETEST B-PLANT UPSTREAM AIR SAMPLING	CP-03-151/W PAGE 12 OF 12

CALIBRATION DATA SHEET

Sampler system vacuum gage calibration record from previous use at B-Plant. DHJ 2-23-04

INPUT RANGE 0 to 30 " Hg.
OUTPUT RANGE 0 to 30 " Hg.
INPUT M&TE TOLERANCE 0.15 " Hg.

STANDARD 815-31-05-004

EXPIRATION DATE 8.14.04

TOLERANCE ± 0.2

DATA:

INPUT VALUE	OUTPUT VALUE	LOW LIMIT	UPPER LIMIT	AS-FOUND	AS-LEFT
4	4	2.5	5.5	4.1	4.1
12	12	10.5	13.5	12.1	12.1
20	20	18.5	21.5	20	20.0

ATTACHMENT 4

LABORATORY REPORT; SAMPLE ANALYISIS RESULTS

Fluor Hanford
WSCF Laboratory Analytical Services
P.O. Box 1000
Richland, WA 99352
Telephone 373-7495
Telefax 372-0456

FLUOR

Memorandum

W1141-SLF-04-185

To:	D. L. Dyekman H8-13 D. L. Johnson L1-05		Date:	May 27, 2004
From:	S. L. Fitzgerald, Manager WSCF Analytical Chemistry			
cc:	w/Attachments		w/o Attachments	
	T. F. Dale	S3-30	D. J. Hart	S3-30
	H. K. Meznarich	S3-30	M. A. Neely	S3-30
	P. D. Mix	S3-30	H. S. Rich	S3-28
	J. E. Trechter	S3-30	File/LB	

Subject: FINAL RESULTS FOR PUREX STACK UPSTREAM SAMPLE PROBE; 291-A-1 STACK–SAMPLE DELIVERY GROUP WSCF20040513

Reference:
(1) Memo, DL Dyekman to SL Fitzgerald, dated March 15, 2004, Letter of Instruction for Analysis of Internally Deposited Radionuclides in the 291-A-1 PUREX Stack Upstream Air Sample Probe (F9300-04-01)
(2) HNF-SD-CD-QAPP-017, Rev. 6, Waste Sampling & Characterization Facility Quality Assurance Plan

This letter contains a revised narrative (Attachment 1) for sample delivery group WSCF20040513. The narrative was revised to correct sample volumes used for analysis.

SLF/grf

Attachments 1

W1141-SLF-04-185

ATTACHMENT 1

NARRATIVE

Consisting of 2 pages
Not including cover page

Attachment 1
Narrative

Sample Delivery Group	**WSCF20040513**
Sample Matrix	**WATER/FILTER**
Sample Visual	**N/A**
SAF Number	**n/a**
Data Deliverable	**Summary Report**

Introduction

Two (2) filter samples, 291-A-1 UPSTREAM #1A, 291-A-1 UPSTREAM #2, one (1) silver zeolite filter sample 291-A-1 UPSTREAM #3 and twelve (12) GRAB Segment 1 Rinse 1-3, Segment 2 Rinse 1-3, Segment 3 Rinse 1-3, Segment 4 Rinse 1-3 samples were received from Effluent and Environmental Monitoring (EEM) at the WSCF Laboratory on March 15 and April 1, 2004.

The two filters were analyzed for Gross Alpha/Beta and then used to create a composite COMP 291-A-1UPSTREAM 1A & 2 which was analyzed for GEA. The 291-A-1 UPSTREAM #3 filter was analyzed for GEA.

Sample preparation - Each sample tube consists of four segments. Each segment was rinsed with 100 mL of acid. Each 100 mL rinse sample was split into 50 mL aliquots. A 50 mL aliquot for each rinse was analyzed for Gross Alpha/Beta.

The remaining 50 mL aliquot from each rinse was combined into a composite sample and 125 mL of water was added for a total composite sample size of 725 mL.

Results for the rinses and composite samples listed in Appendix 1 are raw results and do not include their final volume. The final results may be calculated as follows:

- Rinse samples final results = (reported result) x (0.1 L)
- Composite sample final result for the 2 samples = (reported results) x (.725 L) (2).

The samples were analyzed for analytes indicated on the attached copy of the chain of custody (COC) form.

The narrative (Attachment 1) will address sample characteristics, analyses requested and general information in performance of the analytical methods. A Data Summary Report (Attachment 2) includes analytical results, a comment report detailing method abnormalities, tentatively identified peaks if applicable, method references, and Laboratory QC information. Copies of the chain of custody and Request for Sample Analysis forms are included as Attachment 3.

Analytical Methodology for Requested Analyses

- All Radiochemistry analyses (AEA, GEA, Gross Alpha/Beta, Sr-89/90) were run by internal WDOE accredited WSCF procedures. Analytical work was performed with no deviations to the approved method.

Comments

Radiochemistry – There are no hold times associated with these WDOE accredited methods. A Blank and Laboratory Control Sample was run with each analytical batch for the rinse samples. The composite rinse sample QC included a Blank, Duplicate and Laboratory Control Sample. See pages 2-12 through 2-18 for QC details. Analytical Note: The analytical result for Sr-89/90 is a total for both isotopes. The AEA Duplicates were flagged for poor RPD, all other batch QC was acceptable. The duplicate RPD difference was accept-as-is per radiochemistry chemist. All other QC data was within acceptable limits

This Summary Report is in compliance with the SOW, both technically and for completeness. Release of the data contained in this hard copy report has been authorized by the WSCF Laboratory Analytical Manager and Client Services, as verified by the following signature.

Herlene Rich

Herlene S. Rich
WSCF Production Control

Abbreviations

Hg – mercury
IC – ion chromatography
ICP – inductively coupled plasma
ICP/AES – ICP/atomic emission spectroscopy
ICP/MS – ICP/mass spectrometry
Total U – total uranium
AT/TB – total alpha/total beta
AEA – Alpha Energy Analysis
WTPH-G – Total Hydrocarbons-Gasoline
Am – americium
Cm - curium
Pu – plutonium
Np – neptunium
GEA – gamma energy analysis
H3 – Tritium
Sr – Strontium 89, 90
WTPH-D – Total Hydrocarbons-Diesel
TSS – Total Suspended Solids

W1141-SLF-04-167

ATTACHMENT 2

ANALYTICAL RESULTS

Consisting of 18 pages
Not including cover page

WSCF
ANALYTICAL RESULTS REPORT

for

Effluent and Environmental Monitoring (EEM)
Post Office Box 1970 T6-36
Richland, WA 99352

Attention: Larry Diediker/Dan Johnson

Analytical: ____________________

Client Services: ____________________

All results are reported on an "as received" basis unless otherwise noted in the comment section.

Report#: 20040513
Report Date: 30-apr-2004

WSCF
ANALYTICAL RESULTS REPORT

Attention: Larry Diediker/Dan Johnson **Group #:** 20040513
Project: NFM: Near Field Monitoring

Sample #	Client ID	CAS #	Test Performed	Matrix	WSCF Method	RQ	Result	Unit	DF	MDL	Analyze	Sample	Receive
W040000303	291-A-1 UPSTREAM #1A		Gross Alpha	FILTER	LA-508-415	U	-3.80e-07	uCi	1.00	1.5e-06	03/30/04	02/25/04	03/15/04
W040000303	291-A-1 UPSTREAM #1A	E,T,C	Gross Alpha Abs. Cntg Error	FILTER	LA-508-415		5.60e-07	uCi	1.00	0.0	03/30/04	02/25/04	03/15/04
W040000303	291-A-1 UPSTREAM #1A	12587-47-2	Gross Beta	FILTER	LA-508-415	U	-2.80e-07	uCi	1.00	1.6e-06	03/30/04	02/25/04	03/15/04
W040000303	291-A-1 UPSTREAM #1A	E,T,C	Gross Beta Absolute Cntg Error	FILTER	LA-508-415		7.60e-07	uCi	1.00	0.0	03/30/04	02/25/04	03/15/04
W040000304	291-A-1 UPSTREAM #2		Gross Alpha	FILTER	LA-508-415	U	-2.50e-07	uCi	1.00	1.5e-06	03/30/04	02/25/04	03/15/04
W040000304	291-A-1 UPSTREAM #2	E,T,C	Gross Alpha Abs. Cntg Error	FILTER	LA-508-415		6.20e-07	uCi	1.00	0.0	03/30/04	02/25/04	03/15/04
W040000304	291-A-1 UPSTREAM #2	12587-47-2	Gross Beta	FILTER	LA-508-415	U	-1.80e-07	uCi	1.00	1.6e-06	03/30/04	02/25/04	03/15/04
W040000304	291-A-1 UPSTREAM #2	E,T,C	Gross Beta Absolute Cntg Error	FILTER	LA-508-415		7.80e-07	uCi	1.00	0.0	03/30/04	02/25/04	03/15/04
W040000305	291-A-1 UPSTREAM #3	E,T,C	Cs-137 Rel. CountError GEA-AgZ	FILTER	LA-508-481		259	%	1.00	0.0	03/31/04	02/25/04	03/15/04
W040000305	291-A-1 UPSTREAM #3	10045-97-3	Cs-137 by GEA-AgZ	FILTER	LA-508-481	U	-0.874	pCi	1.00	3.8	03/31/04	02/25/04	03/15/04
W040000305	291-A-1 UPSTREAM #3	E,T,C	I-129 Rel. Count Error GEA-AgZ	FILTER	LA-508-481		13.4	%	1.00	0.0	03/31/04	02/25/04	03/15/04
W040000305	291-A-1 UPSTREAM #3	15046-84-1	I-129 by GEA-AgZ	FILTER	LA-508-481		5.16e+03	pCi	1.00	3.7e+02	03/31/04	02/25/04	03/15/04
W040000305	291-A-1 UPSTREAM #3	E,T,C	Ru-106 Rel. CountError GEA-AgZ	FILTER	LA-508-481		226	%	1.00	0.0	03/31/04	02/25/04	03/15/04
W040000305	291-A-1 UPSTREAM #3	13967-48-1	Ru-106 by GEA-AgZ	FILTER	LA-508-481	U	-8.70	pCi	1.00	33	03/31/04	02/25/04	03/15/04
W040000305	291-A-1 UPSTREAM #3	E,T,C	Sb-125 Rel.CountError GEA-AgZ	FILTER	LA-508-481		1.00e+03	%	1.00	0.0	03/31/04	02/25/04	03/15/04
W040000305	291-A-1 UPSTREAM #3	14234-35-6	Sb-125 by GEA-AgZ	FILTER	LA-508-481	U	-6.46e-03	pCi	1.00	9.7	03/31/04	02/25/04	03/15/04
W040000305	291-A-1 UPSTREAM #3	E,T,C	Sn-113 Rel. CountError GEA-AgZ	FILTER	LA-508-481		122	%	1.00	0.0	03/31/04	02/25/04	03/15/04
W040000305	291-A-1 UPSTREAM #3	13966-06-8	Sn-113 by GEA-AgZ	FILTER	LA-508-481	U	2.07	pCi	1.00	4.5	03/31/04	02/25/04	03/15/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	14596-10-2	Am-241 by AEA	FILTER	LA-508-471		0.450	pCi	1.00	0.12	04/15/04	03/08/04	04/01/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	E,T,C	Am-241 by AEA Total Cntg Error	FILTER	LA-508-471		32.0	%	1.00	0.0	04/15/04	03/08/04	04/01/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	E,T,C	Ce-144 Rel. Count Error (GEA)	FILTER	LA-508-481		526	%	1.00	0.0	04/01/04	03/08/04	04/01/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	14762-78-8	Ce-144 by GEA	FILTER	LA-508-481	U	0.846	pCi	1.00	7.8	04/01/04	03/08/04	04/01/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	E,T,C	CePr-144 Rel. Count Error	FILTER	LA-508-481		526	%	1.00	0.0	04/01/04	03/08/04	04/01/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	CE/PR-144	CePr-144 by GEA	FILTER	LA-508-481	U	1.69	pCi	1.00	16	04/01/04	03/08/04	04/01/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	E,T,C	Co-60 Rel. Count Error (GEA)	FILTER	LA-508-481		212	%	1.00	0.0	04/01/04	03/08/04	04/01/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	10198-40-0	Co-60 by GEA	FILTER	LA-508-481	U	0.567	pCi	1.00	2.2	04/01/04	03/08/04	04/01/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	E,T,C	Cs-134 Rel. Count Error (GEA)	FILTER	LA-508-481		137	%	1.00	0.0	04/01/04	03/08/04	04/01/04

MDL=Minimum Detection Limit U - Analyzed for but not detected above limiting criteria.
RQ=Result Qualifier

DF=Dilution Factor

* - Indicates results that have NOT been validated; + - Indicates more than six qualifier symbols

Report W004/ver. 5.2
Effluent and Environmental Monitoring (EEM)

WSCF
ANALYTICAL RESULTS REPORT

Attention: Larry Diediker/Dan Johnson **Group #:** 20040513
Project: NFM: Near Field Monitoring

Sample #	Client ID	CAS #	Test Performed	Matrix	WSCF Method	RQ	Result	Unit	DF	MDL	Analyze	Sample	Receive
W040000327	COMP 291-A-1UPSTREAM 1A & 2	13967-70-9	Cs-134 by GEA	FILTER	LA-508-481	U	-0.934	pCi	1.00	2.1	04/01/04	03/08/04	04/01/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	E.T.C	Cs-137 Rel. Count Error (GEA)	FILTER	LA-508-481		130	%	1.00	0.0	04/01/04	03/08/04	04/01/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	10045-97-3	Cs-137 by GEA	FILTER	LA-508-481	U	0.741	pCi	1.00	1.8	04/01/04	03/08/04	04/01/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	E.T.C	Eu-152 Rel. Count Error (GEA)	FILTER	LA-508-481		1.00e+03	%	1.00	0.0	04/01/04	03/08/04	04/01/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	14683-23-9	Eu-152 by GEA	FILTER	LA-508-481	U	-0.111	pCi	1.00	3.9	04/01/04	03/08/04	04/01/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	E.T.C	Eu-154 Rel. Count Error (GEA)	FILTER	LA-508-481		258	%	1.00	0.0	04/01/04	03/08/04	04/01/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	15585-10-1	Eu-154 by GEA	FILTER	LA-508-481	U	-1.38	pCi	1.00	6.1	04/01/04	03/08/04	04/01/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	E.T.C	Eu-155 Rel. Count Error (GEA)	FILTER	LA-508-481		216	%	1.00	0.0	04/01/04	03/08/04	04/01/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	14391-16-3	Eu-155 by GEA	FILTER	LA-508-481	U	-1.18	pCi	1.00	3.9	04/01/04	03/08/04	04/01/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	E.T.C	Nb-94 Rel. Count Error (GEA)	FILTER	LA-508-481		441	%	1.00	0.0	04/01/04	03/08/04	04/01/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	14681-63-1	Nb-94 by GEA	FILTER	LA-508-481	U	-0.278	pCi	1.00	1.8	04/01/04	03/08/04	04/01/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	E.T.C	Ru-103 Rel. Count Error (GEA)	FILTER	LA-508-481		131	%	1.00	0.0	04/01/04	03/08/04	04/01/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	13968-53-1	Ru-103 by GEA	FILTER	LA-508-481	U	0.674	pCi	1.00	1.6	04/01/04	03/08/04	04/01/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	E.T.C	Ru-106 Rel. Count Error (GEA)	FILTER	LA-508-481		728	%	1.00	0.0	04/01/04	03/08/04	04/01/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	13967-48-1	Ru-106 by GEA	FILTER	LA-508-481	U	-1.29	pCi	1.00	16	04/01/04	03/08/04	04/01/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	E.T.C	Sb-125 Rel. Count Error (GEA)	FILTER	LA-508-481		108	%	1.00	0.0	04/01/04	03/08/04	04/01/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	14234-35-6	Sb-125 by GEA	FILTER	LA-508-481	U	-2.08	pCi	1.00	3.7	04/01/04	03/08/04	04/01/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	E.T.C	Sn-113 Rel. Count Error (GEA)	FILTER	LA-508-481		197	%	1.00	0.0	04/01/04	03/08/04	04/01/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	13966-06-8	Sn-113 by GEA	FILTER	LA-508-481	U	-0.559	pCi	1.00	1.7	04/01/04	03/08/04	04/01/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	E.T.C	Zn-65 Rel. Count Error (GEA)	FILTER	LA-508-481		914	%	1.00	0.0	04/01/04	03/08/04	04/01/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	13982-39-3	Zn-65 by GEA	FILTER	LA-508-481	U	-0.280	pCi	1.00	4.4	04/01/04	03/08/04	04/01/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	13981-16-3	Pu-238 by AEA	FILTER	LA-508-471	U	0.110	pCi	1.00	0.11	04/15/04	03/08/04	04/01/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	E.T.C	Pu-238 by AEA Total Cntg Error	FILTER	LA-508-471		76.0	%	1.00	0.0	04/15/04	03/08/04	04/01/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	E.T.C	Pu-239/240 AEA Total Cntg Err	FILTER	LA-508-471		33.0	%	1.00	0.0	04/15/04	03/08/04	04/01/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	PU-239/240	Pu-239/240 by AEA	FILTER	LA-508-471		0.660	pCi	1.00	0.070	04/15/04	03/08/04	04/01/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	E.T.C	Sr-90 Rel. Count Error	FILTER	LA-508-415		455	%	1.00	0.0	04/22/04	03/08/04	04/01/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2	10098-97-2	Sr-90 by Beta Counting	FILTER	LA-508-415	U	-0.300	pCi	1.00	0.53	04/22/04	03/08/04	04/01/04

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Report W004/ver. 5.2
Effluent and Environmental Monitoring (EEM)

WSCF
ANALYTICAL RESULTS REPORT

Attention: Larry Diediker/Dan Johnson **Group #:** 20040513
Project: NFM: Near Field Monitoring

Sample #	Client ID	CAS #	Test Performed	Matrix	WSCF Method	RQ	Result	Unit	DF	MDL	Analyze	Sample	Receive
W040000328	Segment 1 Rinse 1	12587-46-1	Gross Alpha	WATER	LA-508-415		9.80	pCi/L	1.00	3.6	04/20/04	03/08/04	04/01/04
W040000328	Segment 1 Rinse 1	E,T,C	Gross Alpha Method Error	WATER	LA-508-415		40.0	%	1.00	0.0	04/20/04	03/08/04	04/01/04
W040000328	Segment 1 Rinse 1	12587-47-2	Gross Beta	WATER	LA-508-415		9.50	pCi/L	1.00	4.2	04/20/04	03/08/04	04/01/04
W040000328	Segment 1 Rinse 1	E,T,C	Gross Beta Method Error	WATER	LA-508-415		35.0	%	1.00	0.0	04/20/04	03/08/04	04/01/04
W040000329	Segment 1 Rinse 2	12587-46-1	Gross Alpha	WATER	LA-508-415	U	-0.360	pCi/L	1.00	3.6	04/20/04	03/08/04	04/01/04
W040000329	Segment 1 Rinse 2	E,T,C	Gross Alpha Method Error	WATER	LA-508-415		500	%	1.00	0.0	04/20/04	03/08/04	04/01/04
W040000329	Segment 1 Rinse 2	12587-47-2	Gross Beta	WATER	LA-508-415	U	-0.360	pCi/L	1.00	4.2	04/20/04	03/08/04	04/01/04
W040000329	Segment 1 Rinse 2	E,T,C	Gross Beta Method Error	WATER	LA-508-415		650	%	1.00	0.0	04/20/04	03/08/04	04/01/04
W040000330	Segment 1 Rinse 3	12587-46-1	Gross Alpha	WATER	LA-508-415	U	3.80e-03	pCi/L	1.00	3.8	04/20/04	03/08/04	04/01/04
W040000330	Segment 1 Rinse 3	E,T,C	Gross Alpha Method Error	WATER	LA-508-415		1.00e+03	%	1.00	0.0	04/20/04	03/08/04	04/01/04
W040000330	Segment 1 Rinse 3	12587-47-2	Gross Beta	WATER	LA-508-415	U	-0.960	pCi/L	1.00	4.4	04/20/04	03/08/04	04/01/04
W040000330	Segment 1 Rinse 3	E,T,C	Gross Beta Method Error	WATER	LA-508-415		255	%	1.00	0.0	04/20/04	03/08/04	04/01/04
W040000331	Segment 2 Rinse 1	12587-46-1	Gross Alpha	WATER	LA-508-415	U	-1.40	pCi/L	1.00	3.6	04/20/04	03/08/04	04/01/04
W040000331	Segment 2 Rinse 1	E,T,C	Gross Alpha Method Error	WATER	LA-508-415		106	%	1.00	0.0	04/20/04	03/08/04	04/01/04
W040000331	Segment 2 Rinse 1	12587-47-2	Gross Beta	WATER	LA-508-415	U	2.20	pCi/L	1.00	4.2	04/20/04	03/08/04	04/01/04
W040000331	Segment 2 Rinse 1	E,T,C	Gross Beta Method Error	WATER	LA-508-415		118	%	1.00	0.0	04/20/04	03/08/04	04/01/04
W040000332	Segment 2 Rinse 2	12587-46-1	Gross Alpha	WATER	LA-508-415	U	-1.10	pCi/L	1.00	3.8	04/20/04	03/08/04	04/01/04
W040000332	Segment 2 Rinse 2	E,T,C	Gross Alpha Method Error	WATER	LA-508-415		150	%	1.00	0.0	04/20/04	03/08/04	04/01/04
W040000332	Segment 2 Rinse 2	12587-47-2	Gross Beta	WATER	LA-508-415	U	-3.20	pCi/L	1.00	4.4	04/20/04	03/08/04	04/01/04
W040000332	Segment 2 Rinse 2	E,T,C	Gross Beta Method Error	WATER	LA-508-415		100	%	1.00	0.0	04/20/04	03/08/04	04/01/04
W040000333	Segment 2 Rinse 3	12587-46-1	Gross Alpha	WATER	LA-508-415	U	-1.10	pCi/L	1.00	3.8	04/20/04	03/08/04	04/01/04
W040000333	Segment 2 Rinse 3	E,T,C	Gross Alpha Method Error	WATER	LA-508-415		150	%	1.00	0.0	04/20/04	03/08/04	04/01/04
W040000333	Segment 2 Rinse 3	12587-47-2	Gross Beta	WATER	LA-508-415	U	-1.90	pCi/L	1.00	4.4	04/20/04	03/08/04	04/01/04
W040000333	Segment 2 Rinse 3	E,T,C	Gross Beta Method Error	WATER	LA-508-415		125	%	1.00	0.0	04/20/04	03/08/04	04/01/04
W040000334	Segment 3 Rinse 1	12587-46-1	Gross Alpha	WATER	LA-508-415	U	3.90e-03	pCi/L	1.00	4.0	04/20/04	03/08/04	04/01/04
W040000334	Segment 3 Rinse 1	E,T,C	Gross Alpha Method Error	WATER	LA-508-415		1.00e+03	%	1.00	0.0	04/20/04	03/08/04	04/01/04
W040000334	Segment 3 Rinse 1	12587-47-2	Gross Beta	WATER	LA-508-415	U	-2.00	pCi/L	1.00	4.5	04/20/04	03/08/04	04/01/04

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WSCF
ANALYTICAL RESULTS REPORT

Attention: Larry Diediker/Dan Johnson — **Group #:** 20040513

Project: NFM: Near Field Monitoring

Sample #	Client ID	CAS #	Test Performed	Matrix	WSCF Method	RQ	Result	Unit	DF	MDL	Analyze	Sample	Receive
W040000334	Segment 3 Rinse 1	E.T.C	Gross Beta Method Error	WATER	LA-508-415		125	%	1.00	0.0	04/20/04	03/08/04	04/01/04
W040000335	Segment 3 Rinse 2	12587-46-1	Gross Alpha	WATER	LA-508-415	U	-0.790	pCi/L	1.00	4.0	04/20/04	03/08/04	04/01/04
W040000335	Segment 3 Rinse 2	E.T.C	Gross Alpha Method Error	WATER	LA-508-415		236	%	1.00	0.0	04/20/04	03/08/04	04/01/04
W040000335	Segment 3 Rinse 2	12587-47-2	Gross Beta	WATER	LA-508-415		5.70	pCi/L	1.00	4.5	04/20/04	03/08/04	04/01/04
W040000335	Segment 3 Rinse 2	E.T.C	Gross Beta Method Error	WATER	LA-508-415		54.0	%	1.00	0.0	04/20/04	03/08/04	04/01/04
W040000336	Segment 3 Rinse 3	12587-46-1	Gross Alpha	WATER	LA-508-415	U	-0.380	pCi/L	1.00	3.8	04/20/04	03/08/04	04/01/04
W040000336	Segment 3 Rinse 3	E.T.C	Gross Alpha Method Error	WATER	LA-508-415		495	%	1.00	0.0	04/20/04	03/08/04	04/01/04
W040000336	Segment 3 Rinse 3	12587-47-2	Gross Beta	WATER	LA-508-415	U	0.960	pCi/L	1.00	4.4	04/20/04	03/08/04	04/01/04
W040000336	Segment 3 Rinse 3	E.T.C	Gross Beta Method Error	WATER	LA-508-415		272	%	1.00	0.0	04/20/04	03/08/04	04/01/04
W040000337	Segment 4 Rinse 1	12587-46-1	Gross Alpha	WATER	LA-508-415		7.40	pCi/L	1.00	4.1	04/20/04	03/08/04	04/01/04
W040000337	Segment 4 Rinse 1	E.T.C	Gross Alpha Method Error	WATER	LA-508-415		50.0	%	1.00	0.0	04/20/04	03/08/04	04/01/04
W040000337	Segment 4 Rinse 1	12587-47-2	Gross Beta	WATER	LA-508-415		16.0	pCi/L	1.00	4.7	04/20/04	03/08/04	04/01/04
W040000337	Segment 4 Rinse 1	E.T.C	Gross Beta Method Error	WATER	LA-508-415		30.0	%	1.00	0.0	04/20/04	03/08/04	04/01/04
W040000338	Segment 4 Rinse 2	12587-46-1	Gross Alpha	WATER	LA-508-415	U	-0.380	pCi/L	1.00	3.8	04/20/04	03/08/04	04/01/04
W040000338	Segment 4 Rinse 2	E.T.C	Gross Alpha Method Error	WATER	LA-508-415		495	%	1.00	0.0	04/20/04	03/08/04	04/01/04
W040000338	Segment 4 Rinse 2	12587-47-2	Gross Beta	WATER	LA-508-415	U	-2.25	pCi/L	1.00	4.4	04/20/04	03/08/04	04/01/04
W040000338	Segment 4 Rinse 2	E.T.C	Gross Beta Method Error	WATER	LA-508-415		101	%	1.00	0.0	04/20/04	03/08/04	04/01/04
W040000339	Segment 4 Rinse 3	12587-46-1	Gross Alpha	WATER	LA-508-415	U	-1.20	pCi/L	1.00	4.0	04/20/04	03/08/04	04/01/04
W040000339	Segment 4 Rinse 3	E.T.C	Gross Alpha Method Error	WATER	LA-508-415		150	%	1.00	0.0	04/20/04	03/08/04	04/01/04
W040000339	Segment 4 Rinse 3	12587-47-2	Gross Beta	WATER	LA-508-415	U	-1.20	pCi/L	1.00	4.5	04/20/04	03/08/04	04/01/04
W040000339	Segment 4 Rinse 3	E.T.C	Gross Beta Method Error	WATER	LA-508-415		211	%	1.00	0.0	04/20/04	03/08/04	04/01/04
W040000394	COMPOSITE ALL Segments	14596-10-2	Am-241 by AEA	WATER	LA-508-471	U	0.0760	pCi/L	1.00	0.84	04/26/04	03/08/04	03/15/04
W040000394	COMPOSITE ALL Segments	E.T.C	Am-241 by AEA Total Cntg Error	WATER	LA-508-471		620	%	1.00	0.0	04/26/04	03/08/04	03/15/04
W040000394	COMPOSITE ALL Segments	E.T.C	Ce-144 Rel. Count Error (GEA)	WATER	LA-508-481		466	%	1.00	0.0	04/16/04	03/08/04	03/15/04
W040000394	COMPOSITE ALL Segments	14762-78-8	Ce-144 by GEA	WATER	LA-508-481	U	6.45	pCi/L	1.00	50	04/16/04	03/08/04	03/15/04
W040000394	COMPOSITE ALL Segments	E.T.C	CePr-144 Rel. Count Error	WATER	LA-508-481		466	%	1.00	0.0	04/16/04	03/08/04	03/15/04
W040000394	COMPOSITE ALL Segments	CE/PR-144	CePr-144 by GEA	WATER	LA-508-481	U	12.9	pCi/L	1.00	1.0e+02	04/16/04	03/08/04	03/15/04

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Report W004/ver. 5.2

Effluent and Environmental Monitoring (EEM)

WSCF
ANALYTICAL RESULTS REPORT

Attention: Larry Diediker/Dan Johnson **Group #:** 20040513
Project: NFM: Near Field Monitoring

Sample #	Client ID	CAS #	Test Performed	Matrix	WSCF Method	RQ	Result	Unit	DF	MDL	Analyze	Sample	Receive
W040000394	COMPOSITE ALL Segments	E,T,C	Co-60 Rel. Count Error (GEA)	WATER	LA-508-481		189	%	1.00	0.0	04/16/04	03/08/04	03/15/04
W040000394	COMPOSITE ALL Segments	10198-40-0	Co-60 by GEA	WATER	LA-508-481	U	-2.06	pCi/L	1.00	6.5	04/16/04	03/08/04	03/15/04
W040000394	COMPOSITE ALL Segments	E,T,C	Cs-134 Rel. Count Error (GEA)	WATER	LA-508-481		98.5	%	1.00	0.0	04/16/04	03/08/04	03/15/04
W040000394	COMPOSITE ALL Segments	13967-70-9	Cs-134 by GEA	WATER	LA-508-481	U	3.96	pCi/L	1.00	7.4	04/16/04	03/08/04	03/15/04
W040000394	COMPOSITE ALL Segments	E,T,C	Cs-137 Rel. Count Error (GEA)	WATER	LA-508-481		1.00e+03	%	1.00	0.0	04/16/04	03/08/04	03/15/04
W040000394	COMPOSITE ALL Segments	10045-97-3	Cs-137 by GEA	WATER	LA-508-481	U	0.223	pCi/L	1.00	7.0	04/16/04	03/08/04	03/15/04
W040000394	COMPOSITE ALL Segments	E,T,C	Eu-152 Rel. Count Error (GEA)	WATER	LA-508-481		166	%	1.00	0.0	04/16/04	03/08/04	03/15/04
W040000394	COMPOSITE ALL Segments	14683-23-9	Eu-152 by GEA	WATER	LA-508-481	U	-8.07	pCi/L	1.00	21	04/16/04	03/08/04	03/15/04
W040000394	COMPOSITE ALL Segments	E,T,C	Eu-154 Rel. Count Error (GEA)	WATER	LA-508-481		173	%	1.00	0.0	04/16/04	03/08/04	03/15/04
W040000394	COMPOSITE ALL Segments	15585-10-1	Eu-154 by GEA	WATER	LA-508-481	U	-6.25	pCi/L	1.00	18	04/16/04	03/08/04	03/15/04
W040000394	COMPOSITE ALL Segments	E,T,C	Eu-155 Rel. Count Error (GEA)	WATER	LA-508-481		442	%	1.00	0.0	04/16/04	03/08/04	03/15/04
W040000394	COMPOSITE ALL Segments	14391-16-3	Eu-155 by GEA	WATER	LA-508-481	U	-3.12	pCi/L	1.00	23	04/16/04	03/08/04	03/15/04
W040000394	COMPOSITE ALL Segments	E,T,C	Nb-94 Rel. Count Error (GEA)	WATER	LA-508-481		216	%	1.00	0.0	04/16/04	03/08/04	03/15/04
W040000394	COMPOSITE ALL Segments	14681-63-1	Nb-94 by GEA	WATER	LA-508-481	U	1.87	pCi/L	1.00	7.0	04/16/04	03/08/04	03/15/04
W040000394	COMPOSITE ALL Segments	E,T,C	Ru-103 Rel. Count Error (GEA)	WATER	LA-508-481		177	%	1.00	0.0	04/16/04	03/08/04	03/15/04
W040000394	COMPOSITE ALL Segments	13968-53-1	Ru-103 by GEA	WATER	LA-508-481	U	2.15	pCi/L	1.00	6.8	04/16/04	03/08/04	03/15/04
W040000394	COMPOSITE ALL Segments	E,T,C	Ru-106 Rel. Count Error (GEA)	WATER	LA-508-481		207	%	1.00	0.0	04/16/04	03/08/04	03/15/04
W040000394	COMPOSITE ALL Segments	13967-48-1	Ru-106 by GEA	WATER	LA-508-481	U	-18.4	pCi/L	1.00	62	04/16/04	03/08/04	03/15/04
W040000394	COMPOSITE ALL Segments	E,T,C	Sb-125 Rel. Count Error (GEA)	WATER	LA-508-481		844	%	1.00	0.0	04/16/04	03/08/04	03/15/04
W040000394	COMPOSITE ALL Segments	14234-35-6	Sb-125 by GEA	WATER	LA-508-481	U	-1.30	pCi/L	1.00	19	04/16/04	03/08/04	03/15/04
W040000394	COMPOSITE ALL Segments	E,T,C	Sn-113 Rel. Count Error (GEA)	WATER	LA-508-481		169	%	1.00	0.0	04/16/04	03/08/04	03/15/04
W040000394	COMPOSITE ALL Segments	13966-06-8	Sn-113 by GEA	WATER	LA-508-481	U	-3.09	pCi/L	1.00	8.7	04/16/04	03/08/04	03/15/04
W040000394	COMPOSITE ALL Segments	E,T,C	Zn-65 Rel. Count Error (GEA)	WATER	LA-508-481		145	%	1.00	0.0	04/16/04	03/08/04	03/15/04
W040000394	COMPOSITE ALL Segments	13982-39-3	Zn-65 by GEA	WATER	LA-508-481	U	8.40	pCi/L	1.00	14	04/16/04	03/08/04	03/15/04
W040000394	COMPOSITE ALL Segments	13981-16-3	Pu-238 by AEA	WATER	LA-508-471	U	-0.100	pCi/L	1.00	1.4	04/26/04	03/08/04	03/15/04
W040000394	COMPOSITE ALL Segments	E,T,C	Pu-238 by AEA Total Cntg Error	WATER	LA-508-471		780	%	1.00	0.0	04/26/04	03/08/04	03/15/04
W040000394	COMPOSITE ALL Segments	E,T,C	Pu-239/240 AEA Total Cntg Err	WATER	LA-508-471		41.0	%	1.00	0.0	04/26/04	03/08/04	03/15/04

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Report W004/ver. 5.2
Effluent and Environmental Monitoring (EEM)

WSCF
ANALYTICAL RESULTS REPORT

Attention: Larry Diediker/Dan Johnson | Group #: 20040513
Project: NFM: Near Field Monitoring

Sample #	Client ID	CAS #	Test Performed	Matrix	WSCF Method	RQ	Result	Unit	DF	MDL	Analyze	Sample	Receive
W040000394	COMPOSITE ALL Segments	PU-239/240	Pu-239/240 by AEA	WATER	LA-508-471		2.00	pCi/L	1.00	0.37	04/26/04	03/08/04	03/15/04
W040000394	COMPOSITE ALL Segments	E,T,C	Sr-90 Rel. Count Error	WATER	LA-508-415		125	%	1.00	0.0	04/29/04	03/08/04	03/15/04
W040000394	COMPOSITE ALL Segments	10098-97-2	Sr-90 by Beta Counting	WATER	LA-508-415		2.20	pCi/L	1.00	2.4	04/29/04	03/08/04	03/15/04

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WSCF
ANALYTICAL COMMENT REPORT

Attention: Larry Diediker/Dan Johnson
Project Number NFM

Group #: 20040513

Sample #	Client ID	Lab Area	Test	Comment
		VALGROUP		W040000394/Am: The duplicate is flagged but the sample activity is below detection. W040000394/Pu: The duplicate failed but all other QC checks came out fine so this batch has been accepted.

Lab Areas: VALGROUP - Group Validation; LOGSAMP - Login for Sample; VALTEST - Test Validation; LOGTEST - Login for Tests; TESTDATA - Test Data Entry

WSCF
TENTATIVELY IDENTIFIED PEAK REPORT

Attention: Larry Diediker/Dan Johnson **Group #:** 20040513
Project Number NFM :Near Field Monitoring

Sample #	Client ID	Test Name	Peak Name	CAS#	RT	RQ	Result	Units
W040000305	291-A-1 UPSTREAM #3	GEA ANALYSIS ON AgZEO Part A	I-129X Count Error				11.628	%
W040000305	291-A-1 UPSTREAM #3	GEA ANALYSIS ON AgZEO Part A	I-129X				5.70e+03	pCi

RQ=Result Qualifier

WSCF
METHOD REFERENCES REPORT

The results provided in this report were generated using the following WSCF Laboratory procedures. For your convenience, this table provides a listing of the regulatory or industry methods that are referenced by each of these WSCF procedures. Please note that the most recent version of the regulatory or industry method is listed here even though the WSCF procedure may reference an older version of the method. Also, a reference to a regulatory or industry method here does not necessarily indicate a verbatim implementation of that method.

LA-508-415	Operation of Protean Alpha/Beta Counters	
	None	No reference to any industry method.
LA-508-471	LA-508-471: ALPHA ENERGY ANALYZER DATA ACQUISITION AND SYSTEM CHECKOUT USING ALP	
	None	No reference to any industry method.
LA-508-481	LA-508-481: GAMMA ENERGY ANALYSIS USING PROCOUNT SOFTWARE	
	None	No reference to any industry method.

Note: A complete list of WSCF analytical procedures and referenced regulatory or industry methods is available online at http://apweb02/asponlinedocs/wscf/sample%20mgmt/ProcedureMethodCrossReference.pdf. This document includes on-line links to full-text versions of the procedures and methods, where available.

Report Date: 30-apr-2004
Report#: 20040513
Report W04M/2

w13qlog v1 30-apr-2004 14:49:44

W13q Worklist/Batch/QC Report for Group# 20040513

WL#	S#	Batch	QC#	Tray Type	Sample#	Test
21819	1	22194		SAMPLE	W040000303	Alpha/Beta- Air Samples (AB30)
21819	2	22194		SAMPLE	W040000304	Alpha/Beta- Air Samples (AB30)
21834	1	22210	25289	SAMPLE	W040000305	GEA ANALYSIS ON AgZEO Part A
21858	1	22233	25327	SAMPLE	W040000327	Gamma Energy Analysis-general
21984	1	22357	25470	BLANK		Americium by AEA
21984	2	22357	25470	LCS		Americium by AEA
21984	3	22357	25470	SAMPLE	W040000327	Americium by AEA
21989	1	22363	25481	SAMPLE	W040000394	Gamma Energy Analysis-general
22003	1	22376	25493	BLANK		Gross Alpha/Gross Beta (AB32)
22003	2	22376	25493	LCS		Gross Alpha/Gross Beta (AB32)
22003	3	22376	25493	SAMPLE	W040000328	Gross Alpha/Gross Beta (AB32)
22003	4	22376	25493	SAMPLE	W040000329	Gross Alpha/Gross Beta (AB32)
22003	5	22376	25493	SAMPLE	W040000330	Gross Alpha/Gross Beta (AB32)
22003	6	22376	25493	SAMPLE	W040000331	Gross Alpha/Gross Beta (AB32)
22003	7	22376	25493	SAMPLE	W040000332	Gross Alpha/Gross Beta (AB32)
22003	8	22376	25493	SAMPLE	W040000333	Gross Alpha/Gross Beta (AB32)
22003	9	22376	25493	SAMPLE	W040000334	Gross Alpha/Gross Beta (AB32)
22003	10	22376	25493	SAMPLE	W040000335	Gross Alpha/Gross Beta (AB32)
22003	11	22376	25493	SAMPLE	W040000336	Gross Alpha/Gross Beta (AB32)
22003	12	22376	25493	SAMPLE	W040000337	Gross Alpha/Gross Beta (AB32)
22003	13	22376	25493	SAMPLE	W040000338	Gross Alpha/Gross Beta (AB32)
22003	14	22376	25493	SAMPLE	W040000339	Gross Alpha/Gross Beta (AB32)
21983	1	22356	25511	BLANK		Plutonium Isotopics by AEA
21983	2	22356	25511	LCS		Plutonium Isotopics by AEA
21983	3	22356	25511	SAMPLE	W040000327	Plutonium Isotopics by AEA
22015	1	22388	25534	BLANK		Strontium 90
22015	2	22388	25534	LCS		Strontium 90
22015	3	22388	25534	SAMPLE	W040000327	Strontium 90
22055	1	22429	25557	BLANK		Plutonium Isotopics by AEA
22055	2	22429	25557	LCS		Plutonium Isotopics by AEA
22055	3	22429	25557	DUP	W040000394	Plutonium Isotopics by AEA
22055	4	22429	25557	SAMPLE	W040000394	Plutonium Isotopics by AEA
22056	1	22430	25558	BLANK		Americium by AEA
22056	2	22430	25558	LCS		Americium by AEA
22056	3	22430	25558	DUP	W040000394	Americium by AEA
22056	4	22430	25558	SAMPLE	W040000394	Americium by AEA
22045	1	22418	25585	BLANK		Strontium 90
22045	2	22418	25585	LCS		Strontium 90
22045	3	22418	25585	DUP	W040000394	Strontium 90
22045	4	22418	25585	SAMPLE	W040000394	Strontium 90

WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: 20040513
Matrix: FILTER
Test: Americium by AEA

SAF Number: NA
Sample Date:
Receive Date:

QC Type	Analyte	CAS #	Results	Units	Analysis Date	Lower Limit	Upper Limit
BATCH QC							
BLANK	Am-241 by AEA	14596-10-2	6.1e-02	pCi	04/15/04	0.000	1000.000
LCS	Am-241 by AEA	14596-10-2	93.840	% Recov	04/15/04	75.000	125.000

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WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: 20040513
Matrix: WATER
Test: Gross Alpha/Gross Beta (AB32)

SAF Number: NA
Sample Date:
Receive Date:

QC Type	Analyte	CAS #	Results	Units	Analysis Date	Lower Limit	Upper Limit
BATCH QC							
BLANK	Gross Alpha	12587-46-1	-2.0	pCi/L	04/20/04	-10.000	10.000
BLANK	Gross Beta	12587-47-2	-2.2	pCi/L	04/20/04	-10.000	10.000
LCS	Gross Alpha	12587-46-1	105.155	%rec	04/20/04	75.000	125.000
LCS	Gross Beta	12587-47-2	103.694	%rec	04/20/04	75.000	125.000

WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: 20040513
Matrix: FILTER
Test: Plutonium Isotopics by AEA

SAF Number: NA
Sample Date:
Receive Date:

QC Type	Analyte	CAS #	Results	Units	Analysis Date	Lower Limit	Upper Limit
BATCH QC							
BLANK	Pu-239/240 by AEA	PU-239/240	1.8e-02	pCi	04/15/04	0.000	1000.000
LCS	Pu-239/240 by AEA	PU-239/240	101.626	%rec	04/15/04	75.000	125.000

WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: 20040513
Matrix: FILTER
Test: Strontium 90

SAF Number: NA
Sample Date:
Receive Date:

QC Type	Analyte	CAS #	Results	Units	Analysis Date	Lower Limit	Upper Limit
BATCH QC							
BLANK	Sr-90 by Beta Counting	10098-97-2	0.8	pCi	04/22/04	0.000	300.000
LCS	Sr-90 by Beta Counting	10098-97-2	102.351	%rec	04/22/04	80.000	120.000

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WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: 20040513
Matrix: WATER
Test: Plutonium Isotopics by AEA

SAF Number: NA
Sample Date: 03/08/04
Receive Date: 03/15/04

QC Type	Analyte	CAS #	Results	Units	Analysis Date	Lower Limit	Upper Limit
Lab ID: W040000394							
BATCH QC ASSOCIATED WITH SAMPLE							
DUP	Pu-239/240 by AEA	PU-239/240	68.456	RPD	04/26/04	0.000	20.000
BATCH QC							
BLANK	Pu-239/240 by AEA	PU-239/240	1.1e+00	pCi/L	04/26/04	-100.000	100.000
LCS	Pu-239/240 by AEA	PU-239/240	97.561	% Recov	04/26/04	75.000	125.000

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WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: 20040513
Matrix: WATER
Test: Americium by AEA

SAF Number: NA
Sample Date: 03/08/04
Receive Date: 03/15/04

QC Type	Analyte	CAS #	Results	Units	Analysis Date	Lower Limit	Upper Limit
Lab ID: W040000394							
BATCH QC ASSOCIATED WITH SAMPLE							
DUP	Am-241 by AEA	14596-10-2	142.205	RPD	04/26/04	0.000	20.000
BATCH QC							
BLANK	Am-241 by AEA	14596-10-2	5.8e-01	pCi/L	04/26/04	-100.000	100.000
LCS	Am-241 by AEA	14596-10-2	97.034	% Recov	04/26/04	75.000	125.000

WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: 20040513
Matrix: WATER
Test: Strontium 90

SAF Number: NA
Sample Date: 03/08/04
Receive Date: 03/15/04

QC Type	Analyte	CAS #	Results	Units	Analysis Date	Lower Limit	Upper Limit
Lab ID: W040000394							
BATCH QC ASSOCIATED WITH SAMPLE							
DUP	Sr-90 by Beta Counting	10098-97-2	9.524	RPD	04/29/04	0.000	20.000
BATCH QC							
BLANK	Sr-90 by Beta Counting	10098-97-2	0.8	pCi/L	04/29/04	-100.000	100.000
LCS	Sr-90 by Beta Counting	10098-97-2	113.610	% Recov	04/29/04	80.000	120.000

W1141-SLF-04-167

ATTACHMENT 3

SAMPLE RECEIPT INFORMATION

Consisting of 3 pages
Not including cover page

Waste Sampling and Characterization Facility
P.O. BOX 1970 S3-30, Richland, WA 99352
PHONE: (509) 373-7004/FAX: (509) 373-7134

4/28/04

ACKNOWLEDGMENT OF SAMPLES RECEIVED

File ICD

Effluent and Environmental Monitoring (EEM)
Post Office Box 1970 T6-36
Richland, WA 99352
Attn: Larry Diediker/Dan Johnson

Customer Code: EEM-ECP
PO#: 119398
Group#: 20040513
Project#: NFM
Proj Mgr: C.J.PERKINS
Phone: 372-8042

The following samples were received from you on 03/15/04. They have been scheduled for the tests listed beside each sample. If this information is incorrect, please contact your service representative. Thank you for using Waste Sampling and Characterization Facility.

Sample#	Sample Id / Tests Scheduled	Matrix	Sample Date
W040000303	291-A-1 UPSTREAM #1A @AIR-30	Air Filter Matrix	02/25/04
W040000304	291-A-1 UPSTREAM #2 @AIR-30	Air Filter Matrix	02/25/04
W040000305	291-A-1 UPSTREAM #3 @AGZ-GEA	Air Filter Matrix	02/25/04
W040000327	COMP 291-A-1UPSTREAM 1A & 2 @AEA-30 @AEA-31 @GEA-GEA @SR90-31	Air Filter Matrix	03/08/04
W040000328	Segment 1 Rinse 1 @AB-32	Water	03/08/04
W040000329	Segment 1 Rinse 2 @AB-32	Water	03/08/04
W040000330	Segment 1 Rinse 3 @AB-32	Water	03/08/04
W040000331	Segment 2 Rinse 1 @AB-32	Water	03/08/04
W040000332	Segment 2 Rinse 2 @AB-32	Water	03/08/04
W040000333	Segment 2 Rinse 3 @AB-32	Water	03/08/04
W040000334	Segment 3 Rinse 1 @AB-32	Water	03/08/04
W040000335	Segment 3 Rinse 2 @AB-32	Water	03/08/04
W040000336	Segment 3 Rinse 3 @AB-32	Water	03/08/04
W040000337	Segment 4 Rinse 1 @AB-32	Water	03/08/04
W040000338	Segment 4 Rinse 2 @AB-32	Water	03/08/04

TFG

Effluent and Environmental Monitoring (EEM)
Post Office Box 1970 T6-36
Richland, WA 99352
Attn: Larry Diediker/Dan Johnson

Customer Code: EEM-ECP
PO#: 119398
Group#: 20040513
Project#: NFM
Proj Mgr: C.J.PERKINS
Phone: 372-8042

Sample#	Sample Id / Tests Scheduled	Matrix	Sample Date
W040000339	Segment 4 Rinse 3 @AB-32	Water	03/08/04
W040000394	COMPOSITE ALL Segments @AEA-30 @AEA-31 @GEA-GEA @SR90-31	Water	03/08/04

Test Acronym Description

Test Acronym	Description
@AB-32	Gross Alpha/Gross Beta (AB32)
@AEA-30	Plutonium Isotopics by AEA
@AEA-31	Americium by AEA
@AGZ-GEA	GEA ANALYSIS ON AgZEO Part A
@AIR-30	Alpha/Beta- Air Samples (AB30)
@GEA-GEA	Gamma Energy Analysis-general
@SR90-31	Strontium 90

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ATTACHMENT 4

PUREX UPSTREAM AIR SAMPLE CHAIN-OF-CUSTODY

Company: FH
Company Contact: Dan Johnson, 373-4209
ZCC40513

Analysis Request: Gross Alpha/Beta and GEA on each individually (primary, secondary, and probe rinses), then combine all for Sr-90, Pu isotopic, Am-241. Analyze silver zeolite cartridge for I-129.

Sample Number	Sample Point ID	On		Off		On Flow Rate (scfm)	Off Flow Rate (scfm)	Comments
		Date	Time	Date	Time			
1A	291-A-1 Upstream	2/25/04	1015	3/8/04	1205	3.0	3.0	Primary filter W040000303
1B	291-A-1 Upstream	N/A						Primary filter
1C	291-A-1 Upstream	N/A						Primary filter
1D	291-A-1 Upstream	N/A						Primary filter
1E	291-A-1 Upstream	N/A						Primary filter
1F	291-A-1 Upstream	N/A						Primary filter
2	291-A-1 Upstream	2/25/04	1015	3/8/04	1205	3.0	3.0	Secondary filter W040000304
3	291-A-1 Upstream	2/25/04	1015	3/8/04	1205	3.0	3.0	Silver Zeolite Catridge W040000305
Probe	291-A-1 Upstream	2/25/04	1015	3/8/04	1205	3.0	3.0	Decon probe and filter holder for re-use. Include this as part of the probe sample.

Sample Collected By: [signature] / 0048468
Signature HID#

Relinquished By: [signature] / 0048468 Date: 3/15/04 Time: 0835
Signature HID#

Received By: [signature] / HC064324 Date: 3/15/04 Time: 0835
Signature HID#

Relinquished By: ______ / ______ Date: ______ Time: ______
Signature HID#

Received By: ______ / ______ Date: ______ Time: ______
Signature HID#

Relinquished By: ______ / ______ Date: ______ Time: ______
Signature HID#

LABORATORY
FINAL SAMPLE DISPOSAL METHOD: ______ By: ______ Date: ______ Time: ______
Signature